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Gold, Guilds and Government

The Impact of Monetary and Labour Policies on the Flemish Cloth Industry, 1390-1435

John H. Munro

1 Fourteenth-Century Flemish Monetary Policies and the Cloth Industry

In two seminal articles, the late Professor Hans Van Werveke contended that the monetary policies of the fourteenth-century count of Flanders, Louis II de Male (1347-1384), '*although unintentionally on his part*, checked, for some time at least, the decay of the Flemish cloth industry', which had long provided the county's principal source of prosperity, and 'which provided work to nearly half the population of the towns'.[1] That monetary policy consisted of extensive coinage debasements, which were undertaken principally in order to increase the count's very substantial incomes from mint-seigniorage fees: i.e., to force a recoinage of previous issues and to encourage a influx of new bullion into his mints.[2] In the 35 years from May 1349 to his death in February 1384, Count Louis reduced the precious metal contents of the silver coinage by 53.1 per cent and of the gold coinage, by 54.2 per cent.[3] In Van Werveke's view those coinage debasements greatly ben-

* Much earlier and somewhat different versions of this paper were delivered to the Medieval Academy of America (Tucson, 1993); 28th International Congress on Medieval Studies (Kalamazoo,1993); the Labour Economics Workshop, University of Toronto; the Economic History Workshop, Northwestern University; the Economic History Workshop, University of Illinois at Champagne-Urbana; and the Economic History Workshop, University of Western Ontario. I wish to thank participants in those conference sessions and workshops for their criticisms, advice, and suggestions; and also, in particular, I offer my thanks to Joel Mokyr, Larry Neal, David Laidler, Hanno Brand, Peter Stabel, Walter Simons, Erik Thoen, and Bas Van Bavel, to the anonymous referees for this paper; and to the editor, Hans Mol, for his gracious assistance in editing the final version of this article. Research for this article was funded, in part, by grants from the Social Sciences and Humanities Research Council of Canada (3-195-156-06; 410-93-0866; 410-96-0306; 410-99-0274).

1 Van Werveke, 'Currency Manipulation in the Middle Ages', 255-267, with quotation on 266 (126-127). See also Van Werveke, 'De economische en sociale gevolgen', 1-15; and Van Werveke, *De koopman-ondernemer,* 5-25. For a similar discussion of the supposedly favourable impact of coinage debasements on the Italian cloth industry in this same period, see Cipolla, 'Currency Depreciation in Medieval Europe', 413-433; and Cipolla, *The Monetary Policy of Fourteenth-Century Florence*.

2 For these coinage debasements, see also Blockmans, 'Devaluation, Coinage, and Seignorage', 69-94. For the economics of coinage debasements and how they could enhance a ruler's incomes, see Munro, 'An Aspect of Medieval Public Finance', 127-145; Munro, *Wool, Cloth, and Gold*, 11-42; Munro, 'Mint Policies', 71-116; Munro, 'Monnayage', 263-294; Munro, 'Maze of Medieval Mint Metrology', 173-199.

3 The last debasement was in September 1383. See Van Werveke, *De muntslag in Vlaanderen*, 1-8, and also the sources in nn. 1-2 above (with revised statistics). In debasing both coinages almost equally, Count Louis had been able to maintain a bimetallic ratio, approximately 10.4:1, that was consistently more favourable to silver than the current English mint ratio (a constant 11.16:1 in this era).

efited the industrial entrepreneurs of the cloth industry, by permitting them to pay their artisans the same wages in silver coins whose intrinsic value was continuously reduced, thereby reducing their real costs of production and 'lowering the selling price of cloth'. For the Flemish cloth industry such measures provided the only means by which 'it could hold out against foreign competition'.[4]

The deadly threat to the Flemish cloth industry came principally from the rapidly expanding English cloth trade, which, from as early as 1358-1359, had provoked the Flemish into imposing a strictly enforced ban on any English cloth imports.[5] Since, as I have argued elsewhere extensively, the Flemish cloth industry had in fact continued to enjoy some prosperity until the Second Artevelde Revolt era (1379-1385), and then, sometime after its suppression had briefly enjoyed a respectable survival, from about 1410 to 1430, perhaps Van Werveke was correct; and that indeed both of Count Louis' policies may have been surprisingly successful, though that should be a subject for future debate.[6]

Those Flemish monetary policies did not, however, long outlive the count. His son-in-law and successor, Philippe-le-Hardi (Philip the Bold), duke of Burgundy (1380-1404), and from 1384 also count of Flanders, finally discontinued the coinage debasements, shortly after the Artevelde Revolt had ended; and then in 1389-1390 he introduced the exact opposite policy, a *renforcement* designed to restore much of the silver in the Flemish coinage, and thus make it appear more respectable and worthy of the eminent French duke. While Hans Van Werveke did write an important and very perceptive article on Duke Philip's coinage reform, he did not comment on the impact that this total reversal in monetary policy may have had on the Flemish cloth industry;[7] and curiously, for the historiography of late medieval Flanders, no one else has really discussed this issue. In assessing the subsequent fate of the Flemish cloth industry, historians must clearly understand that Duke Philip's monetary policy also necessitated changes in labour policies, which together with the new monetary policy certainly seems to have had significant consequences for the Flemish cloth industry until the 1430s, when an entirely new set of highly ill-advised monetary policies in both Flanders and England precipitated the real crisis that led to the final downfall of the Flemish (and Brabantine) cloth industries. Somewhat surprisingly, the aspects of the Duke Philip's monetary and labour policies that, in the early fifteenth century, came to be the most contentious issue in Flemish industrial relations involved changes in

4 Van Werveke, 'Currency Manipulation', 126-127. While correctly noting that a debasement served the same purpose as a modern devaluation, his argument would have been more cogent had it further noted that such debasements reduced the foreign-exchange value of goods priced in Flemish silver currency, in relation to the foreign gold coins with which merchants paid for Flemish cloths.

5 Munro, 'Bruges and the Abortive Staple', 1137-1159; Munro, 'Industrial Protectionism', 229-268.

6 See Munro, 'Anglo-Flemish Competition', 37-60; Munro, 'Symbiosis of Towns and Textiles', 1-74; Munro, 'The European Woollen Industries', 244-262. See below, pp. 181-182, and nn. 99-100.

7 Van Werveke, 'De Vlaamse munthervorming van 1389-1390', 336-47. See also Van Werveke, 'De economische en sociale gevolgen', 13-15 (251-252); but his brief references here do not deal with these issues.

the bimetallic mint ratio: in particular, changes in the relative value of wages when expressed in silver or in gold coin.

Very shortly after becoming ruler of Flanders, Philip the Bold had, in fact, made an abortive first attempt to impose just such a monetary reform, in a *renforcement* that was totally unprecedented in medieval Flanders. In July 1384, his mint officials prescribed new coin issues that were 21.0 per cent stronger in silver and 29.8 per cent stronger in gold; and that change in the bimetallic mint ratio was one that 'favoured' silver, with a relatively higher purchasing power for coins in that metal. But all too quickly, Philip himself discovered a pressing need for mint seigniorage revenues, not just for paying for the extra costs in ending the Ghent-led Artevelde revolt, but also for financing his Guelders war. Thus, in four alterations between April 1386 and October 1388, Duke Philip reduced the silver contents of his *groot* coinages by another 33.4 per cent overall.[8]

A year later, during the months of December 1389 and January 1390, he found a more propitious time to impose what, this time, did become a highly successful *renforcement*: strengthening the silver coinage by 31.6 per cent and the gold coinage even more, by 41.7 per cent; but as in the previous but abortive *renforcement* this change in bimetallic ratio similarly meant one that 'favoured' silver.[9] That coinage *renforcement* had two very important and related economic consequences directly affecting the Flemish cloth industry: both in its wage payments and its export prices.

The changes in the bimetallic mint ratio, over the period of this study, are shown in Table 1. The term 'bimetallic' may, however, be somewhat misleading. For, although both Flanders and England had become 'bimetallic' in the mid-fourteenth century, by establishing their first effective gold coinages, their monetary economies still remained based essentially on a silver standard.[10] Thus their money-of-account or pricing systems – the pound sterling in England and the *pond groot* in Flanders – remained anchored in their current silver coinages, which also governed almost all their domestic transactions and wage payments, while gold

8 For a Flemish subsidy of 100,000 gold *francs* for 'pacifying' Flanders and for the Guelders war, see Gilliodts-van Severen, *Inventaire des archives de Bruges*, III, 111, no. 695 (22 February 1388). The silver coinage was debased by 13.5 per cent overall from April to October 1386, by another 16.4 per cent in April 1387, and finally by 8.0 per cent in October 1388. See Munro, *Wool, Cloth, and Gold*, 43-63; Munro, 'Mint Policies', 83-88; and Cockshaw, 'La circulation monétaire', 107-141.

9 See n. 7. The silver contents of the single *groot* (1.018 g) were restored to about the same level of 1380 (1.011 g) and again for 1386 (1.022g). The double *groot* was strengthened by 31.8 per cent. Munro, *Wool, Cloth, and Gold*, 43-64; Munro, 'Mint Policies', 84-90. In monetary history, the term 'favour' means, in this respect, a bimetallic ratio that offers coins in that metal (silver) a relatively higher purchasing power and higher value in relation to gold than that offered in neighbouring countries.

10 England adopted the gold noble in August 1344, valued at 6s 8d sterling, superseding the abortive florin of December 1343 (but the very first English gold coin had been Henry III's unsuccessful gold penny of 1257). See Feavearyear, *The Pound Sterling*, 28-32; and Mayhew, 'From Regional to Central Minting', 163-166. Flanders' first successful gold coin was the florin (*florijn*) commencing in June 1335. See Blockmans, 'Devaluation, Coinage, and Seignorage', 69-94; and Algemeen Rijksarchief België, Rekenkamer, Comptes en Rouleaux no. 790.

provided the major though certainly not exclusive medium for international trade and finance. Thus the Flemish weaver-drapers and master fullers certainly used silver almost exclusively for not just wages but most other domestic production 'inputs' (such as butter or grease, soap, fuller's earth, teasels, some dyestuffs, various tools, etc.), while they or the merchants and brokers with whom they dealt used chiefly gold coins in purchasing imported 'inputs': many of their dyestuffs and most of their wools, indeed almost exclusively English wools in producing luxury quality cloths for export. In pricing their woollens for the market – and some considerable quantity of textiles were sold in the domestic markets of Flanders and Brabant – these drapers initially valued them in terms of the silver-based *pond groot* (*livre gros*) of Flanders. In this money of account pricing system, the pound always represented 240 currently circulating silver pence (d); and the shilling, 12 pence. In selling their fine exported woollens to foreign merchants, most of whom were resident within Flanders itself, or employed factors there (principally in Bruges) to conduct their trade, the weaver-drapers, brokers, or Flemish merchants then converted these prices, recorded in *ponden groot*, into the relevant gold coins. Table 2 shows the prices of Ghent's *dickedinnen* broadcloths, the town's most renowned luxury woollen cloth export, in both such terms: in silver-based *pond groot* and stable Florentine gold florins – the 'dollar of the Middle Ages' - during the debasement era of Louis de Male and then during the subsequent debasement years and finally the *renforcement* era of Duke Philip the Bold.

Clearly the current bimetallic or exchange ratio was an important consideration for the Flemish cloth industry; and the 1390 *renforcement*, by strengthening the gold coinage so much more than the silver, automatically altered the Flemish bimetallic ratio even more strongly in 'favour' of silver: from 10.41 to 9.68:1, to be compared with the current English mint ratio of 11.16:1. That differential would have encouraged foreign merchants trading with England to make payments in gold (e.g., to buy wool), but, in trading with Flanders, to make more of their payments in silver.[11] That change also meant, necessarily, an exactly proportional reduction in the official exchange rate on the new Flemish gold *noble,* first struck in 1388, from 8s 6d to 6s 0d *groot* Flemish (from 102d to 72d *groot*).[12] Consequently, if the silver-based price of Ghent *dickedinnen* shown in Table 2 had not changed from the £7 10s 0d *groot* indicated for the early 1380s – and undoubted-

11 Having dropped so precipitously in the 1330s, the international bimetallic ratio underwent some recovery in this same period (at Venice, rising from 9.4:1 in 1350 to 11.4:1 in 1380), indicating an increase in the relative value or purchasing power of gold. See Spufford, *Handbook of Medieval Exchange*, lxi (graph 4); and lxiii (table II); and Lane and Mueller, *Money and Banking in Medieval and Renaissance Venice*, I, 364-397.

12 Monetary ordinance of 20 December 1389 published in Bartier and Van Nieuwenhuysen, *Les ordonnances de Philippe le Hardi,* I, 349-50 (no. 232). See Van Werveke, 'Vlaamse munthervorming', 336-347; Munro, *Wool, Cloth, and Gold,* 49-55; and Munro, 'Mint Policies', 83-88. The change in the exchange rate, a fall of 29.4 per cent , is again inversely proportional to the strengthening of the gold coinage (41.7 per cent). Thus [1/(1.00 + 0.417) – 1] = – 0.2943. For a more complete explanation, see Munro, 'Deflation and the Petty Coinage Problem', 389-392. See also Table 2, for the fall in the exchange rate on the Florentine florin, which was slightly less: – 25.9 per cent.

ly it was much higher during the inflationary late-1380s (when price data are regrettably lacking) – its gold price would have risen from 17.65 to 25.0 Flemish *nobles* after the 1390 *renforcement*, possibly pricing those woollens out of the market. But instead, as Table 2 shows, Ghent cloth prices dropped substantially in both *ponden groot* and Florentine florins, by and from the 1390s.

Presumably one benefit that the Flemish drapers had derived from that change in the bimetallic ratio was a reduction in the price of the gold *nobles* necessary for purchasing English wools, which were now accounting for over 70 per cent of their total cloth-manufacturing costs.[13] Unfortunately for the Flemish there was still no effective substitute for English wools, Europe's finest, in luxury cloth production (not yet even Spanish *merino*); and a major reason for the rise in the gold prices of Flemish woollens in Table 2 was the steep increase in England's taxation of wool exports, especially from the 1360s.[14] Indeed by recently issuing these new Flemish *nobles,* from October 1388, as slightly inferior imitations of the widely-accepted English nobles, Duke Philip had already facilitated those wool purchases, while also maintaining a respectable volume of gold minting during the 1390s, despite the unfavourable bimetallic ratio.[15]

2 The 1390 Monetary Reform and 'Real Wages': the Problem of Nominal Wage-Stickiness

Nevertheless, that necessary reduction in cloth prices also required some substantial cut in the wages of all textile artisans producing those cloths, so that industrial entrepreneurs would not be caught in a vicious price-cost squeeze. Historically, however, imposing such wage cuts has never been an easy task; and labour economists and historians are familiar with the so-called ratchet effect in wage-de-

13 For relative production costs see Munro, 'Industrial Protectionism', 256-257 (Tables 13.2 and 13.3); and Munro, 'The Medieval Scarlet', 52 (Table 3.12).

14 For English and Spanish wool qualities and prices, see Munro, 'Wool Price Schedules', 118-169; and Munro, 'Textiles, Textile Technology and Industrial Organisation', 186-191. English customs and subsidies imposed as specific duties on wool exports from the outset of the Hundred Years' War, in 1337, rose from 40s per woolsack (364 lb = 165.11 kg) to 50s a sack by the 1370s; and by 1390, with the fall in wool prices, these duties accounted for 50 percent of the sales price. These English wools had become all the more expensive after the establishment of the Calais Staple in 1363, to control wool sales to northern Europe as a quasi-monopoly (imposing uniform wool prices per county of origin), which more effectively passed the tax incidence on to the foreign buyers, chiefly in the Low Countries. See Lloyd, *The English Wool Trade,* 144-224; Ormrod, 'The Crown and the English Economy', 167-175; Munro, 'Industrial Protectionism', 254-255 (Table 13.1), Munro, 'Mint Outputs, Money, and Prices', 102-103 (Table B-4); Munro, 'Anglo-Flemish Competition', 37-60; Munro, 'The Western European Woollen Industries', 278-283, 299 (Table 5.1)

15 See Munro, *Wool, Cloth, and Gold,* 43-63; Munro, 'Mint Policies', 83-88; Munro, 'Maze of Medieval Monetary Metrology', 173-199. After Duke Philip had successfully adjusted his mint prices, his subjects were able to obtain 31 counterfeit Flemish nobles per marc (244.753 g) of 23.75 carats gold compared to 30.789 good English nobles per marc at England's Calais mint (= 30.951 nobles per marc of 23.875 fineness, or 44.25 per Tower Pound of 349.914 g, with that fineness).

termination: i.e., that nominal or money wages very rarely move downwards. That inflexibility is also known as 'downward wage stickiness'. It generally accompanies periods of deflation, and thus provides a significant exception to the general fall in prices (since wages are the price of labour). One might explain that phenomenon by what is called the 'money illusion': the supposedly irrational belief that money has a fixed or stable value, so that a wage cut would mean a net reduction in actual disposable income and wealth. Thus such people would be extremely reluctant to accept a wage cut, unless the stark alternative was unemployment. To be sure, if wages were cut during a period of continuously falling prices, many employees might be no worse off than before. But few were (or are) able to predict the extent and duration of any deflation; but many might well predict that when prices began to rise again, their money wages would not – would still remain fixed.

Indeed those fears are not far fetched. For, even though money wages have tended, historically, to be more flexible during inflation, though generally lagging behind prices, some surprisingly prolonged wage-stickiness can be perceived during such eras, up to the dawn of modern times. Adam Smith, the founding father of modern Classical Economics, observed in famous *Wealth of Nations* (1776), during such a period of rising prices, that:

> in many places the money price of labour remains uniformly the same sometimes for half a century together.....The high price of provisions during these ten years past has not in many parts of the kingdom been accompanied with any sensible rise in the money price of labour.[16]

Most of Smith's disciples, however, were less cognizant of this historic problem of wage-stickiness; and, during this past century's Great Depression, John Maynard Keynes caustically observed, in his famous *General Theory* [1936], that 'Classical Theory has been accustomed to rest the supposedly self-adjusting character of the economic system on an assumed fluidity of money-wages'. On the contrary, stated Keynes:[17]

> To suppose that a flexible wage policy is a right and proper adjunct of a system, which on the whole is one of *laissez-faire*, is the opposite of the truth. It is only in a highly authoritarian society, where sudden, substantial, all-round changes could be decreed that a flexible wage-policy could function with success. One can imagine it in operation in [Fascist] Italy, [Nazi] Germany or [Soviet] Russia, but not in France, the United States or Great Britain.

Although Burgundian Flanders was, of course, far from being such an authoritarian society, government officials (ducal and urban) did immediately impose reductions of about 25 percent in wages and all payments whose values were expressed in the silver-based *pond groot*.[18] The calculation was almost exact; for a

16 Smith, *Wealth of Nations*, 74.

17 Keynes, *General Theory,* 257, 269.

18 See the ducal monetary ordinance of 5 December 1390, by which Duke Philip permitted Ghent, Bruges, Ypres, and the Franc to: 'ordener de la maniere du paiement desdictes rentes a heritage ou a vie, cense et loages de maisons', except for properties and debts of the duke and nobil-

reduction that was inversely proportional to the silver *renforcement* of 31.6 per cent would have been exactly 24.0 per cent.[19] At Bruges, the daily money-wages of master masons, carpenters, and other building craftsmen, which had risen during the inflationary 1380s, were abruptly and arbitrarily cut from 12d to 9d *groot*, in early 1390, as were those of their journeymen, from 6d to 4d 12 mites (i.e., 4.5d).[20] According to some contemporary reports, such wage reductions did produce riots and considerable social unrest in several Flemish cities.[21] That year of unrest was evidently not the opportune moment to reduce the wages of Bruges' policemen; and their wage reduction, a rather smaller one of 16.7 per cent, from 6d to 5d *groot* daily, was strategically delayed until 1397.[22] But indeed most of the protests had subsided well before then, possibly because many may have finally, if grudgingly, accepted the oft-proclaimed official argument that, while their new wages were indeed so much lower, those wages were being paid in the new 'strong' silver coinage of the 1390 reform, rather than in the former 'weak' silver coinage. That indeed is a situation rather different from one in which wages are cut with an unchanged currency.

3 Nominal and Real Wages: calculating purchasing power with price-relatives (index numbers)

A major problem to be resolved in this study, for not only the Bruges building craftsmen (and policemen) but especially for the textile artisans, and specifically

ity, for whom all payments were to be reckoned at the new rate of 72d for the noble. Bartier and Van Nieuwenhuysen, *Les ordonnances de Philippe le Hardi,* I, 399-400, no. 262. See Van Werveke, 'De economische en sociale gevolgen', 13-15 (251-252); Van Werveke, 'De Vlaamse munthervorming van 1389-90', 341-343; De Roover, *Money, Banking and Credit in Mediaeval Bruges*, 227-228.

19 By the monetary formula for a *renforcement*: [1/(1 + x)] – 1, where x = the percentage change in the silver content of the groot. Thus [1/(1.316) – 1] = 0.760 – 1 = – 0.240 or 24.0 per cent .

20 Stadsarchief Brugge, Stadsrekeningen 1388/1389 to 1399/1400: wage payments for building craftsmen in the 'werken' accounts. See also Table 3.

21 In Gilliodts-van Severen, *Archives de la ville de Bruges,* III, 134-135 (no. 706), 134-135, 140-142 (January 1390). See also Van Werveke, 'De economische en sociale gevolgen', 6-15 (243-253); Van Werveke, 'De Vlaamse munthervorming van 1389-1390', 341-344; De Roover, *Money, Banking and Credit in Mediaeval Bruges*, 227-229; Van der Wee, *Growth of the Antwerp Market*, II, 14-18, 29-30.

22 In 1383, during the Artevelde revolt (1379-85) and just before the initial, abortive *renforcement* of 1384, the daily wages of Bruges master craftsmen in the building trades had been reduced even more sharply, from 12d to 8d *groot*, but were raised to 9.33d in 1386 and then fully restored to 12d in 1387. In 1386, just after the suppression of the Artevelde revolt, the daily wages of Bruges policemen had been raised from 6d to 7.67d (7d 16 mites) *groot*, but were set back to 6d in 1387. Note that the policemen's daily wages were paid for a 365-day year. Data extracted from the Bruges municipal accounts: Stadsarchief Brugge, Stadsrekeningen 1382/1383 to 1397/1398. Unfortunately the Ghent wage accounts are far too sparse to permit similar comparisons, and Ypres' *stadsrekeningen* now survive only from 1406 in the second copy deposited at the Lille Chambre des Comptes, now in the Algemeen Rijksarchief België.

for the wage-earning fullers, is to discern whether or not they were actually worse off, better off, or unchanged in their economic circumstances with the combination of these wage cuts, the 1390 monetary reform, and the ensuing deflation.

The only way to resolve this problem is to calculate the artisan's 'real wage': that is, the quantity of essential goods and services that he could purchase with his annual money-wage income. Usually it is computed in terms of price-relatives by the following equation involving three indexes: RWI = NWI/CPI. Or, in simple words: the Real Wage Index equals the quotient of the Nominal Wage Index divided by the Consumer Price Index. For medieval and early modern England, the Phelps Brown and Hopkins 'Basket of Consumables' price-index has best served a generation of historians in providing such a useful 'CPI'. Its base period is 1451-1475 = 100: the one recommended by the International Scientific Committee on Price History (1929) as an ideal period of relatively stable prices that could serve as an anchor for both medieval and early-modern surveys of the European economies.[23] This 'base' is computed taking the sum of the prices for all of the commodities in the basket for each of these years 1451-1475, and by dividing those sums by 25 to obtain the mean, as the index number 100 for each commodity and then for the basket as a whole. Thus a CPI of 125 means that the value of the basket or average price level is 25 percent higher than in the base period. In the equation RWI = NWI/CPI, all three sets of indexes have, of course, the common base of 1451-1475. Subsequently Herman Van der Wee constructed a similar 'basket of consumables' for the Antwerp-Lier-Brussels region of Brabant (1400-1700), with the same base period; but his composite price index, unlike the Phelps Brown & Hopkins index, also supplies the actual values of each commodity and of the total basket in money-of-account (i.e., in d *groot* of Brabant).[24] I myself subsequently constructed a similar 'basket of consumables' price index for Flanders, for 1349 to 1500, based on both the Phelps Brown & Hopkins and the Van der Wee indexes.[25] While the 'real wages' for Bruges building craftsmen (chiefly masons, carpenters, and pavers) can be expressed by the formula RWI = NWI/CPI, because we know their mean wage for the years 1451-1475 (at 11d

23 Phelps Brown and Hopkins, 'Seven Centuries of the Prices of Consumables', 12-59. The weights are in terms of fixed expenditure shares: 20.0 percent for farinaceous goods (wheat, rye, barley, and peas); 22.5 percent for drink (in this period, barley malt); 25.0 percent for meat and fish; 12.5 percent for butter and cheese; 7.5 for fuel and light; and 12.5 percent for textiles (woollens, linens, canvas).

24 Van der Wee, 'Prijzen en lonen', 413-447. For the base period 1451-1475, the weights are: grains (rye), 18.24 percent; drink (barley malt), 17.0 percent; meat and fish, 27.82 percent; butter and cheese, 11.05 percent; fuel and light, 7.82 percent; and textiles (woollens and linens), 18.00 percent.

25 This price index is constructed essentially from the published price data in Verlinden, Craeybeckx, and Scholliers, *Dokumenten voor de geschiedenis van prijzen en lonen,* I and II.i, supplemented by more textile prices from *stadsrekeningen* (annual civic treasurer's accounts) in the Stadsarchief Gent. In this Flemish 'basket of consumables' the weights for the base period 1451-1475 are: farinaceous (wheat, rye, barley, peas), 24.19 percent; drink (barley malt), 20.43 percent; dairy products (butter and cheese only), 35.37 percent; textiles (cheap woollens), 20.01 percent. For a further analysis, see: Munro, 'Wage Stickiness', 186-190, 231 (Table 1).

groot Flemish), we lack such data for fullers' wages and thus cannot use this formula to compute changes in their 'real wages'. Instead, however, we may represent such changes by estimating the number of Flemish 'baskets of consumables' that a craftsman, journeyman, or labourer might have been able to purchase with an annual wage income for 210 days; and indeed this method obviates many of the difficulties that accrue in using index numbers.[26]

A further problem, in dealing with the fullers, is that only the journeyman's daily wage, and not that of the master, can be properly estimated. Normally, each journeyman received 35 percent of the wage, while the master received only 30 percent; but of course he did not therefore earn less. The master fuller was himself an entrepreneur, and not merely an artisan, and one who usually owned several fulling vats, employing many journeymen; and thus he could earn vastly more than any single journeymen. At the same time, many master fullers were engaged in other trades as well (selling, for example, beer and bread, as well as raw materials for fulling). The combined wage for the master and two journeymen was a combination piece-work and time-rate wage, in that this team was required to full a standard broadcloth (21.00 metres by 1.663 metres for a Ghent *dickedinnen*, when fulled) in three days. Thus, at Ghent, from 1373 to 1390, the fee for fulling such a cloth was 45d *groot*, from which each journeyman received, in effect, 5.25d per day (i.e., 5d 6 mites, compared to a Bruges policeman's wage of 6d per day in 1390).[27]

4 Wages, Labour Strife, and The Fullers' Guilds of Ghent, Wervik, and Kortrijk in the 1390s

If public protests had gradually subsided after the 1390 monetary reform, nevertheless wage-cuts did produce some significant labour strife within the Flemish cloth industry. Significantly, however, labour relations in this new Burgundian era had shifted from strikes to ducal arbitration. Only the fullers have left us with any

26 Statistical justification for the choice of this number of days can be found in Van der Wee, *Growth of the Antwerp Market,* I, 540-544 (Appendix 48: 'table of employment trend in the building sector, 1437-1600', at Antwerp and Lier). In twelfth-century England, Walter of Henley had indicated that the normal working year consisted of at most 44 weeks or 264 days (6 days a week). See Oschinsky, *Walter of Henley,* 314-315, c. 30. For other estimates of the effective working year, see Munro, 'Urban Wage Structures', 65-78. My calculations indicate that percentage changes in the real wages of Bruges' building craftsmen are identical when computed in terms of index numbers or numbers of 'baskets of consumables'.

27 Thus 5.25d per day for two journeymen working three days equals 31.5d, leaving 13.5 d (or 4.5d per day) for the master fuller. In Leiden, in February 1435, the official wage for fulling two *voirwollen halvelakenen* (equals one broadcloth) was 46d *groot* Flemish: of which the master received 14d (30.43 percent, or 4.67d per day), and each of the two journeymen, 16d (34.78 per cent each, or 5.333d per day). Posthumus, *Bronnen*, I, 136-139, nos. 121, 124. At Wervik, however, the 1397 wage rate provided a very different and most unusual split: 14d for each of the two journeymen (i.e., 4.67d per day) but only 7d for the master; and possibly the master fuller was allowed to operate more fulling vats than were masters in other towns. See n. 33 below.

records of organized collective opposition, and, for this period, in just three drapery towns: Ghent, Kortrijk, and Wervik. Whether or not they would prove to be successful in their protests depended, of course, upon the power that they could exercise through their guilds or *ambachten*. Surprisingly the weakest were the Ghent fullers, in the largest and oldest of these cloth-manufacturing towns. As early as 1361, in their ongoing struggle with their employers, the weaver-drapers, the fullers were evicted from the town government (the *schepenen*); and shortly after that, they also lost the right to select their own guild leaders.[28] Early in 1390, they had evidently acquiesced, without any recorded opposition, in a quite harsh 29 per cent reduction in their combined money-wage, for a master and two journeymen in fulling a *maerclaken* broadcloth in three days: from 45d to 32d *groot*.[29] What makes their situation even more pitiful is that, unlike the building craftsmen in Bruges, they had not received any increase in money-wages since 1373 – one then awarded by Count Louis de Male, after the weaver-drapers had brutally crushed a fullers' strike.[30] Since the inflationary conditions of the 1380s still prevailed in 1390, the wage-reduction to 32d *groot* meant an overall decline of 41.4 per cent in the journeyman fuller's real wages: from 8.111 'baskets of consum-

28 See Fris, 'Les origines de la réforme constitutionelle', 421-459; Nicholas, *Ghent in the Age of the Arteveldes*, 1-16, 135-177; Nicholas, *The Van Arteveldes of Ghent*, 72-119; Nicholas, 'The Governance of Fourteenth-Century Ghent', 235-262; Van Werveke, *Gand*, 62-69.

29 Rates deduced from texts in Espinas and Pirenne, *Recueil de documents*, II, 535-537, no. 492; Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 2208; and especially Rijksarchief van Oost-Vlaanderen te Gent, Oostenrijks Fonds, layette 2 (for 2 May 1423): 'desquelz [desdiz foulons] ils n'avoient et ne leur en vouloit en baillier que trente deux gros ... et est salaire trop petit...'. See also Van Werveke, 'De economische en sociale gevolgen', 4-14; Nicholas, *Ghent in the Age of the Arteveldes,* 130; Nicholas, *Medieval Flanders*, 273-284; and the following note.

30 Count Louis de Male evidently intervened to make this wage award to thwart his foe, the Ghent weaver-drapers. Text of 4 September 1373 in Rijksarchief Van Oost-Vlaanderen, Oostenrijks Fonds, layette 1; provisions also repeated in layette 2 (2 May 1423). See also Espinas and Pirenne, *Recueil de documents*, II, 526-527 (no. 485: ordinances banning strikes); 533-535 (no. 491: letters of the *deken* of weavers guild submitting dispute with fullers to arbitration); 535-537 (no. 492: Ghent fullers seek the count's pardon, who then awards a wage of 45d per *maerclaken* – evidently a broadcloth to be sold on the market). We do not know the earlier wage. In January 1386, after their real wage had deteriorated by 23 per cent (as measured by this Flemish price index: from 8.111 baskets in 1373 to 6.251 baskets), the fullers' peaceful request for another increase now encountered a very hostile reaction from Count Louis' successor, Duke Philip. Fully supporting the drapers, he curtly told the fullers 'to be content' with their current wage, and furthermore decreed that henceforth any foreign fullers would be free to establish fulleries within Ghent. Duke Philip also rebuffed the fullers' demands for a change in their guild constitution. Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 2208; also partly published in Bartier and Van Nieuwenhuysen, *Ordonnances de Philippe le Hardi,* I, 123-124, no. 88. On this weaver-fuller strife and the political-economic situation in Ghent in particular, see: De Vocht, 'Gentse antwoord op de armoede', 3-32; Boone, *Gent en de Bourgondische hertogen ca. 1384-ca. 1453*, 133-134; Boone and Brand, 'Vollersproeren en collectieve actie in Gent en Leiden', 168-192; Boone, Brand, and Prevenier, 'Revendications salariales et conjoncture économique', 59-74; Boone, 'L'industrie textile à Gand', 15-61; and Brand and Stabel, 'De ontwikkeling van vollerslonen', 203-211; Munro, 'Industrial Entrepreneurship', 377-388; and for more general economic conditions, prices, wages, and living standards in late fourteenth-century Flanders, see Thoen, *Landbouwekonomie en bevolking in Vlaanderen*, I, 234-299.

ables' purchased in 1373 to just 4.757 such baskets in 1390.[31]

The fullers in the other two but smaller drapery towns of Wervik and Kortrijk were considerably more fortunate, perhaps because they were both members of the so-called *nieuwe draperie* (better known as the *nouvelles draperies*). While they had both begun their existence in producing cheap light fabrics, they had switched, from about the 1330s or 1340s, to producing genuine woollens of much higher quality, indeed in imitation of those luxury woollens produced by the Flemish *drie steden* of Ghent, Bruges and Ypres, such as the *dickedinnen*; but they sold them at considerably lower prices, if much higher prices than for English broadcloths. Consequently, by the later fourteenth and early fifteenth centuries, they had proved to be more successful in marketing their woollens, especially in Mediterranean markets, than were many draperies in the *drie steden*.[32] Nevertheless, wage reductions were still mandatory in the *nieuwe draperie*.

In Wervik, shortly after the 1390 *renforcement*, the bailiff governing this feudal seigneury decreed a 27 per cent cut in the fullers' pay: from 48d to 35d *groot* per cloth, which still left the Wervik fullers better off than those in Ghent. Even so, their guild did protest, but rather too late, in May 1392, by appealing to the ducal Council of Flanders. Ignoring the current condition of their Ghent brethren, the Wervik fullers contended that this wage reduction was unjust, because the Bruges fullers were still being paid as much in 'strong' money as they had previously received in 'weak' money. Whatever the truth to such an allegation – which cannot be verified – the ducal council fully supported the Wervik drapers and the bailiff; and this newly imposed wage rate of 35d *groot* per cloth was included in the Wervik drapery regulations or *keuren*, when the revised regulations were promulgated in October 1397.[33]

The most successful fullers in protesting wage cuts were those in the Kortrijk guild, evidently because they had lodged their protest much earlier, and with greater vigour. Like the Ghent fullers, they felt themselves to be unfairly treated victims who had also not enjoyed any increase in money wages since 1374, despite the ravages of inflation that had taken place since then, indeed a 22.2 percent rise

31 See Table 5. Not until 1423, after renewed inflation and another strike, would the Ghent fullers obtain any further raise in their money wages. See below, pp. 167-168.

32 See Melis, 'Uno sguardo al mercato dei panni di lana a Pisa', 321-365; Melis, 'La diffusione nel Mediterranea occidentale dei panni di Wervicq', 219-243; Melis, 'L'industrie drapière au moyen âge dans la vallée de la Lys', 151-161; Coornaert, 'Draperies rurales', 60-96; Munro, 'Industrial Transformations', 114-119, 143-148 (Appendix 4.1); Munro, 'Origins of the English New Draperies', 35-48, 50-51, 64-65; Munro, 'The Western European Woollen Industries', 249-259, 318-324 (Table 5.10). For more on the economies of these small towns, but more especially in the Ghent region, see in particular Stabel, 'Décadence ou survie?', 63-84; Stabel, *De kleine stad in Vlaanderen*; Stabel, *Dwarfs Among Giants.*

33 De Sagher, *Recueil de documents,* III, 445-446 (no. 553), 451-452, 468 (no. 554:136). The two journeymen were to receive 14d groot each and the master 7d, for a total of 35d per cloth in three days. The journeymen were also to receive another 1.25d groot (16d parisis) for scrubbing the cloths ('van erdene'). The Wervik *dickedinnen* broadcloth was to be 38 ells (26.6 m) by 9.5 quarter ells (1.663 m) on the loom.

in the Flemish price level (or CPI: from 106.82 to 130.49 in 1390).[34] In quick response to the mandated cut in their pay, from 41d to 32d per broadcloth fulled, the Kortrijk fullers guild appealed to Duke Philip's councillors, even though the reduction was a relatively modest 22 percent.

In their defence and counter-brief to the Council, the Kortrijk weaver-drapers made a most intriguing argument that would unwittingly cause them considerable grief in subsequent wage negotiations. They cited the central provisions of the 1390 monetary *renforcement*, and its consequences, to justify their proposed wage cut. They rightly contended that, while exchange rates on the gold coins for which they sold their cloths had necessarily fallen, they now had to pay their textile artisans wages in the new 'strong' money instead of the old 'weak money'; and that they would suffer grievously if the wage rates were not correspondingly reduced. With such convincing arguments, and with powers of compulsory arbitration, the ducal Council imposed a new wage rate: one of 36d *groot*. As in so many modern arbitration cases, that settlement was about half way between the demands of the two parties; and it also meant a relatively minor nominal wage reduction of 12 percent. At the same time, however, Duke Philip's councillors took notice of the draper's other monetary argument by stipulating that this new wage was henceforth to be defined as equal to a half gold *noble*, which was then worth 3s or 36d *groot*.[35] But that wage-equivalence and the exchange rate depended upon maintaining a bimetallic ratio that had, in fact, virtually reached its historic nadir.[36]

Thus the indisputable winners in this set of wage conflicts of the 1390s were clearly the Kortrijk fullers, because, even with the 12 percent cut in nominal wages, they soon found themselves so much better off, in purchasing power, from the stark deflation that quickly ensued. Presumably, the 1390 Flemish *renforcement*, which necessarily reminted the existing stock of debased silver coins into fewer stronger coins, was a major but not the only cause of that deflation. Thus, the fall in Flemish price index during the early 1390s, was a precipitous 39.6 percent (from 130.49 in 1390 to just 78.91 in 1393), while the fall in the money-of-account value of fine silver, with the 1390 coinage *renforcement*, was (as noted earlier) only 24.0 percent.[37] Measured in terms of quinquennial means, the Flemish

34 Again thanks to intervention from Count Louis de Male. Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1103; partly published in Espinas and Pirenne, *Recueil de documents,* I, 668-669 (no. 206) and in Bartier and Van Nieuwenhuysen, *Ordonnances de Philippe le Hardi*, I, 385-386 (no. 253). The only previous wage datum is for a wage increase to 15d 4 mites in 1348.

35 Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1103; partly published in Espinas and Pirenne, *Recueil de documents*, I, 668-669 (no. 206); and in Bartier and Van Nieuwenhuysen , *Ordonnances de Philippe le Hardi,* I, 385-386 (no. 253): 'les diz drapiers disans que ce estoit trop grand salaire et qu'ilz devoient estre contens de xxxii [32] gros, attendu que au temps de la dicte ordonnance [1373-1374, of Louis de Male] la monnoie estoit plus feble que elle n'est de present, car le franc d'or valoit pour lors xxxvii [37] gros ou environ et aujourduy il ne vault que xxxiii [33], et selonc ce que la dicte monnoie estoit plus forte le salaire des diz foulons devoit estre diminue...' (In fact the silver coinage of 1374 was stronger than that of 1390).

36 See Table 1. The bimetallic ratio of 8.81:1 in December 1416 was artificially too low and could not be sustained.

37 The reduction in the silver *traite*, because of the *renforcement*, as noted before, was from

price index fell from a peak of 124.72 in 1386-1390 to a trough of 88.53 in 1401-1405, an overall decline of 29.0 percent. In England, whose coinages had remained quite unchanged since 1351, the deflation had commenced earlier but was almost as severe: with a fall in the quinquennial mean CPI of 27.22 percent, from the peak 146.10 in 1366-1370 to one of 106.33 in 1391-1395; and although English prices did show some slight recovery thereafter, the mean CPI again fell, to 108.11 in 1411-1415. In both England and Flanders, the livestock and industrial price-indexes also fell, and roughly in tandem with grain prices;[38] and that provides further evidence that this was a genuine deflation, produced fundamentally by monetary factors, and not just a fall in food prices produced by demographic factors.[39]

The extent of the Flemish deflation and the consequent rise in real wages can be seen in Tables 3-4 . Thus, despite the 25 per cent reduction in their money-wages, the building craftsmen in Bruges (masons and carpenters), enjoyed a significant rise, of 28.9 percent, in their real wage in the decade from 1386-1390 to 1396-1400: in terms of the harmonic quinquennial mean, an increase from 14.152 commodity baskets (RWI = 77.375) to 18.241 baskets (RWI = 99.371). If deflation was the major factor explaining that rise in their real wage, another was a small increase or partial restoration in their nominal wages, in 1396-1397: the masters, from 9d to

£5.337 to £4.050 *groot* per kg of fine metal; and expressed in terms of the physical change in coinage : [1/(1.00 + 0.316)] – 1 = 0.7598 –1 = – 0.2401. See Munro, 'Mint Policies', 85-95, Munro, 'Mint Outputs, Money, and Prices', 96, 100 (Tables B-1 and B-3); Munro, 'Monnayage', 263-294; Munro, 'Maze of Medieval Mint Metrology', 173-199.

38 See Phelps Brown & Hopkins, 'Seven Centuries of the Prices of Consumables', 28; Munro, 'Wage Stickiness', 211-226; and Table 3 below. In England, from 1371-1375 to 1391-1395, the grain-price index fell from a mean of 133.20 in to one of 110.89; the meat-fish-dairy products index fell from 134.13 to 102.80; and the industrial (fuel and textiles) index fell from 147.60 to 103.25. In Flanders, from 1386-1390 to 1396-1400, the mean grain-price index fell from 132.75 to 92.73; the dairy products index, from 122.66 to 92.132; and the industrial price index, from 110.47 to 79.118. As noted above, my Flemish price index contains only textiles (cheap *strijptelaken* and *voeringlaken*) for the industrial group sub-index. For the few other industrial prices available for late fourteenth-century Flanders, see graphs in Sosson, *Les travaux de la ville de Bruges*, 289-293: no. 1, for paving stones: very few data, but with a sharp decline in the later 1390s; no. 2, for bricks: decline in late 1380s, rise in early 1390s, then decline (to 1405); no. 3: for slates, decline in early 1390s, then rise, then decline, from 1400 to c. 1410; no. 4, for lime: sharp decline in early 1390s, then stable; no. 5, for solder: stable; and iron: severe fluctuations. For a similar graph, though only for solder and iron prices, see also Thoen, *Landbouwekonomie en bevolking in Vlaanderen*, I, 255 (figure 16).

39 For conditions of monetary contraction that may explain this deflation, see Day, 'The Great Bullion Famine', 12-35; Day, 'Monetary Contraction in Late Medieval Europe', 12-29; Miskimin, *Cash, Credit, and Crisis in Europe*: essays nos. III, IV, VII, VIII, XI, XII; and Spufford, *Money and Its Use in Medieval Europe*, 339-62. While these scholars emphasize a diminution in bullion supplies and money stocks, I give a greater emphasis to a reduction in monetary flows (decline in velocity). See in particular, Munro, 'Mint Policies', 71-116; Munro, 'Bullion Flows and Monetary Contraction', 97-158; Munro, 'Mint Outputs, Money, and Prices', 31-122; Munro, 'Deflation and the Petty Coinage Problem', 387-423; Munro, 'Wage Stickiness', 211-217. For the inability of credit instruments to counteract these deflationary forces, at least in late-fourteenth-century England, see Nightingale, 'Monetary Contraction and Mercantile Credit', 560-575. In Flanders, the debasements of the 1380s may have thus counteracted and delayed deflation.

10d; and journeymen, from 4.5d to 5d.[40] Faring almost as well were the Kortrijk journeymen fullers. By 1396-1400 their real wage, again in terms of Flemish commodity baskets, was 25.5 per cent higher than it had been during the inflationary debasement years of 1386-1390: i.e., 7.777 baskets, compared to 6.197 baskets. In 1395, their real-wage (8.753 baskets) was 63.5 per cent higher than that earned when their contract was imposed in 1390 (5.352 baskets); and it was in fact by far the highest real wage that they had so far achieved.

Deflation also rescued the fortunes of the once hapless Ghent fullers. Despite that 29 percent reduction in their nominal wage, their real wage had risen from 4.757 commodity baskets in 1390 to 7.867 baskets in 1393, 9.35 percent higher than their real wage in 1388 (7.191 baskets). Calculated in terms of quinquennial harmonic means, their real wage in 1396-1400 (6.913 baskets) was 7.16 percent higher than it had been a decade earlier, in 1386-1390 (6.451 baskets); but that real wage was still 5.61 percent lower than it had in 1381-1385 (7.324 baskets).[41]

5 Fullers' Guilds and Wage Disputes with the Resumption of Inflation, 1416-1434

As tables 4-6 clearly indicate, this era of relatively high real-wages was of short duration; and their decline from 1416, in particular, can be readily explained by yet another series of war- and debasement-induced inflations. When the English king Henry V defeated the French armies at Agincourt (October 1415), in the midst of the ongoing Burgundian-Armagnac civil war, and then secured a Burgundian alliance, Flanders once more became actively involved in the Hundred Years' War.[42] The subsequent Flemish coinage debasements and war-taxation, beginning in December 1416, evidently succeeded in disgorging large amounts of hoarded metals, as did the contemporary French debasements, and to a lesser extent, the English as well.[43] In the Low Countries, the consequence was not only almost inevitable inflation, but also, from June 1418, changes in the bimetallic ra-

40 Stadsarchief Brugge, Stadsrekeningen 1384-1385 to 1399/1400: from the *werken* accounts.

41 The harmonic mean is the reciprocal of the arithmetic mean of the reciprocals of the individual numbers in a given series. The mathematical expression for this harmonic mean is: HM = 1/ [$\sum (1/r_1 + 1/r_2 + 1/r_3 + ... 1/r_n)$] / N . N is the number of values in the series; and in this equation it is 5. The reciprocal values (1/n) for the five years are summed and divided by 5; and then the reciprocal value of this quotient is calculated. It is a much better way of estimating the mean purchasing power of wages than is the arithmetic mean. See Mills, *Introduction to Statistics*, 108-109, 405-424.

42 See Vaughan, *Philip the Bold*, 193-227; Munro, *Wool, Cloth, and Gold,* 65-76.

43 See Munro, *Wool, Cloth, and Gold,* 65-92; Munro, 'Mint Policies', 83-116; Munro, 'Bullion Flows and Monetary Contraction', 131-145 (Tables 1-8); Miskimin, *Money and Power*, 135-139 (Table III), supplemented by Sussman, 'Missing Bullion', 152-161. England's 16.7 per cent silver debasement and recoinage of 1411-1412, however, was relatively minor compared to the French and Burgundian monetary changes, and with prevailing deflationary forces, there was almost no inflation, despite quite large mint outputs.

tios that came to favour gold more and more (See Table 1).

The latter changes meant, to be sure, that the new Flemish prince, Duke Philip the Good of Burgundy, was debasing his gold coins somewhat more heavily than the silver; and his very drastic gold debasements in the 1420s were undertaken, as he later confessed, both to finance and supply gold coins for his military expeditions in France and Holland.[44] Hence, as Table 1 shows, the bimetallic ratio rose from an absolute low of 8.81:1 (in 1416) to 9.67:1 in June 1418 and finally to an extraordinarily high ratio of 14.13:1 in July 1426.[45] At the same time, some of that rise in the bimetallic ratio was evidently due to international market forces, reflecting a relative scarcity of gold, which would raise the normal commercial ratio to about 12:1 by the mid-century.[46] Thus the combination of such inflationary debasements, manipulations of the mint ratios, and market forces all combined to force up the rates on the Flemish gold noble during the 1420s.

By 1422, those inflationary forces were provoking considerable labour unrest in Flanders. The Flemish price index that year (112.41) was 38 per cent higher than in 1404 (81.512), the nadir of this era's deflation; and the exchange rate on the Flemish gold *noble* had risen from 6s to 7s or 84d *groot*. That *noble,* furthermore, was inferior to the Duke Philip the Bold's original Flemish *noble* in both fineness and weight; and had it been that original, fuller-weight *noble,* its exchange rate would have been even higher (Table 1). Earlier, in 1419, the Kortrijk fullers had successfully petitioned Duke John the Fearless (1404-1419) to reconfirm their 1390 labour contract: specifically that their wage be valued at a half *noble;* and subsequently his son and successor Philip the Good (1419-1467) issued a similar decree.

In late 1421, the Kortrijk fullers demanded that this decree be enforced and that they be paid that stipulated wage of a half-noble, i.e., 42d *groot*.[47] The drapers,

44 In a speech before Ghent's *collatie* of craft-guild *dekenen* in January 1447, he stated that: 'You also well know how, during a lull in the war in France, I had to wage a burdensome and murderous war against the English [Humphrey, Duke of Gloucester] in my lands of Holland, Zeeland and Friesland in order to protect Flanders ... This war...had cost me, besides all the heavy expenses that I incurred throughout this period in the French war, over a million gold *saluts*, which at first I was extremely ill-prepared to find.' Cited (and translated) by Vaughan, *Philip the Good*, 307-308, quoting from Fris, *Dagboek van Gent*, I, 57-68.

45 See Munro, *Wool, Cloth, and Gold,* 65-92, 209-210 (Tables J-K); Munro, 'Mint Policies', 110-111 (Table 8); Munro, 'Bullion Flows', 150-51 (Table 10). The first debasement, of December 1416, had changed the bimetallic mint ratio from 9.6:1 to 8.81:1, far too low to be maintained. See the next note.

46 See Munro, 'Bullion Flows', 125-126, 148-151 (Table 10), 156-158 (Graphs I-III); Van der Wee, *Antwerp Market,* I, 131-132 (Table XVI); Spufford, *Handbook,* lxii (Table II, for Venice: 12:1, in 1455-1460); Spufford, *Money*, 354 (Table 7). Since there were no significant new supplies of silver before the commencement of the South German-Central European silver mining boom in the 1460s, the explanation cannot lie with silver supplies. On this, see Munro, 'The Central European Silver Mining Boom', 119-183.

47 Algemeen Rijksarchief België, Trésor de Flandre, Series I, no. 1120: decree of Philip the Good, dated 20 January 1423, citing the 1390 Kortrijk ordinance and an ordinance of his father Duke John dated 1419. The 1419 ordinance is also cited in the decree of 28 June 1434. Ibidem, no. 1127.

however, 'notwithstanding the great labour of the fullers and also the dearness of materials, of wood, fullers-earth [*erde*] and other things used in fulleries', obdurately refused to pay a penny more than the current wage of 36d *groot*. In April 1422, the now enraged Kortrijk fullers went out on strike (*ledichganc*), by deserting the drapery town. From then until the following December, the Kortrijk magistrates supported by Philip's wife, Duchess Michelle, begged, entreated, and then ordered the fullers back to work; but in vain.[48]

The next month, in January 1423, Duke Philip himself intervened to resolve the strike, once more by compulsory arbitration. Even though his carefully written judgement cited the provisions of the 1390 labour contract, of the 1419 and succeeding ordinances, he clearly decided that the Kortrijk drapers had put forth the more compelling case. They had contended that a wage of 42d *groot* per cloth was undeserved when it would be so much higher than the prevailing fullers' wages at Ghent, Ypres, 'and other towns' (though Bruges was conveniently not mentioned), while the woollens from Kortrijk's *nieuwe draperie* were not as large as the traditional broadcloths from these three leading draperies, in the so-called *drie steden*. Duke Philip thus decreed that the Kortrijk fullers must return to work at the former prevailing wage of 36d *groot*, but with two concessions. First, the ducal government agreed to reimburse the fullers for their legal expenses (£60 *groot*); and secondly, he decreed that their wage would be increased if, as, and when the Flemish coinage was again changed.[49] Though Philip had much earlier promised the Flemish Estates not to alter the Flemish coinage again before 1433, and was then undertaking debasements only in his adjacent territories (Namur and Holland), war-related fiscal necessity soon forced him to break that promise within Flanders itself.[50]

Meanwhile, even before the Kortrijk dispute had been settled, the long-suffering Ghent fullers also went out on strike, demanding an increase in their wage from the 32d *groot* per cloth, set in 1390, to 45d, specifically claiming the nominal wage that Count Louis de Male had awarded them in 1373, and a wage that they had indeed enjoyed until 1390. Because of such rampant inflation since Agincourt, the purchasing power of their wage in 1422 (5.522 commodity baskets) was now 27.5 per cent below their real wage in 1404 (7.616 baskets).[51] Just the same, the Ghent weaver-drapers were hardly in any position to award such a large wage increase of 41 per cent. The ensuing strike became, quite understandably, a bitter one. Thus, 'pour appaiser ledit débat', the Ghent magistrates and the ducal bailiff together requested Duke Philip's personal arbitration. This time he was much more sympathetic to the strikers; and, on 2 May 1423, he awarded the Ghent fullers a 25 per cent wage increase, to 40d *groot* per cloth.[52] While that was cer-

48 Algemeen Rijksarchief België, Trésor de Flandre, Series I, nos. 1116-1118.

49 Algemeen Rijksarchief België, Trésor de Flandre, Series I, no. 1120.

50 Munro, *Wool, Cloth, and Gold*, 65-92.

51 The mean price-index for 1421-1425 (CPI = 112.18) was 26.7 per cent higher than the mean for 1401-1405 (88.53). See Tables 3-4.

52 Rijksarchief van Oost-Vlaanderen te Gent, Oostenrijks Fonds: Layette 2: 'pour le débat entre les bonnes gens du mestier des foulons en nostre ville de Gand dune part et les drapiers et bonnes gens du mestier des tisserans...'. See also Boone, *Gent en de Bourgondische hertogen*, 136;

tainly a very substantial increase, subsequent inflation unfortunately meant that their mean real wage for 1426-1430 (6.589 baskets) was still 6.0 percent below their mean earnings (at 32d *groot)* in 1401-1405 (7.012 baskets).

In settling both strikes, Duke Philip had extracted from the two fullers' guilds the solemn promise that they would never strike again, and that their guild leaders would always inform both their town governments and the ducal officials of any industrial disputes with the weaver-drapers. He had also rejected the Ghent fullers' request that the guild's self-government be restored to them, and decreed instead that their *gouverneur* be chosen each year by 'les plus notables des deux membres qui en ont le gouvernement', effectively by the Ghent *schepenen* or magistrates.[53] Not long afterwards, in March 1425, the fullers were severely condemned and some ring-leaders were exiled for having engaged in 'plusieurs poursuites tres aigres pour avoir nouvel gouvernement en leur dit mestier'; and two years later, in July 1427, the Ghent fullers again went out on a full scale strike, deserting the town to seek refuge in the nearby county of Hainaut, while threatening to shut down the Ghent drapery by force, and conspiring with Ypres' fullers to demand wage increases.[54] By early 1428, however, the Ghent fullers' strike had been thoroughly crushed, with confiscations and the exile of the leaders; and, for this era, there is no record of any further industrial strife.[55]

Meanwhile, after considerable inflation, the restless fullers of Kortrijk were also agitating for a wage increase. But shortly after the Flemish coinage debasement of November 1428, their grievances were momentarily appeased, when the ducal officials, observing at least partially Philip the Good's earlier promise, raised their wage from 36d to 44d *groot* per cloth, a 22.2 per cent nominal increase. Nevertheless, that new wage rate was still less than half the official value of the Flemish gold noble, now 8s 0d *groot* (96d), as established by that debasement.[56] Then, after a further and ruinous series of drastic debasements in his adjacent principalities of Namur and Brabant, Duke Philip abruptly reversed course and implemented a coinage *renforcement* in October 1433 – May 1434, one that also united the coinages and monetary systems of all his Burgundian territories in the Low Countries.

Boone and Brand, 'Vollersproeren en collectieve actie', 168-92; Boone, Brand, and Prevenier, 'Revendications salariales', 63-68.

53 Rijksarchief van Oost-Vlaanderen te Gent, Oostenrijks Fond, layette 2: 'sur la requeste dediz foulons touchant le gouvernment de leur dit mestier avons ordonne ... que la chose demeure en tel estat comme elle est auparavant...' See also the secondary sources cited in n. 52.

54 Texts from Rijksarchief van Oost Vlaanderen te Gent, Raad van Vlaanderen, no. 7351, quoted and/or cited in Boone, *Gent en de Bourgondische hertogen*, 136-37. Since I was unable to locate this document on my visit to this Rijksarchief in December 1997, I am greatly indebted to Marc Boone for this citation. See also other sources cited in n. 52.

55 Boone, *Gent en de Bourgondische hertogen*, 136-137, noting that the Ghent fullers were quiescent during the revolt of 1449-1453 against Philip the Good. See also the other sources cited in n. 52.

56 See evidence from the ducal decrees and judgements of Nov. and Dec. 1433 and June 1434, in Algemeen Rijksarchief, Trésor de Flandre, Series I, nos. 1123-1124 and 1127. For the monetary changes, see Munro, *Wool, Cloth, and Gold,* 209 (Table J), p. 209.

6 Wage Disputes with Monetary Reform and Deflation after 1433: the Flemish and Dutch Fullers' Guilds

Again promising the Estates not to alter the coinage, this time for twenty years, Philip issued a new silver *groot* or *groot vierlander* coinage for the Burgundian Lowlands, which was only 7.0 per cent stronger than his last Flemish coinage of November 1428, but 29.7 per cent stronger than his last, very heavily debased silver coinage struck in Namur. Striking an entirely new gold coin, the *Philippus,* more popularly called the *rijder* (*cavalier*), to replace the noble, the ducal government set the new bimetallic mint ratio at 10.87:1 (Table 1).[57] Though considerably lower than those mint ratios established by his recent Namur debasements, it was still somewhat higher than the previous Flemish ratio, set in November 1428 (10.75:1), and even higher than the current English mint ratio at London and Calais, now 10.33:1.[58]

That Burgundian coinage *renforcement* and the problem of gold-exchange rates provided the necessary and quite predictable circumstances for provoking yet another fullers' strike at Kortrijk in that very same year of 1433. The Kortrijk weaver-drapers, evidently anticipating that prices and wages would necessarily fall with the new stronger coinage issues, as in 1390, had demanded that the fullers' wage increase of 1428 be rescinded: that their wage be restored to the 36d *groot* established by the January 1423 contract, and indeed also by the 1390 agreement. Since the current Flemish price index (139.21) was 34.9 per cent higher than in 1423 (103.23) , the Kortrijk fullers understandably refused to bargain and literally walked out, deserting the town. On 17 November 1433, the bailiff of Kortrijk ordered the striking fullers to return to work at the stipulated wage of 36d *groot* per cloth. Needless to say, they did not.[59]

When the ducal officials then intervened to resolve this strike, the fullers were obdurate in their demands: a wage of a half *noble* per cloth, as clearly stipulated in the 1390 agreement, the 1419 ordinance, and implicitly promised by the duke's

57 Munro, *Wool, Cloth, and Gold,* 100-102, 198-211 (Tables C, E-G, J-K); Munro, 'Bullion Flows', 150-151 (Table 10); Spufford, *Monetary Problems and Policies*, 29-42. The new 1433 double groot, with 1.629 g pure silver (replacing the old coins in Brabant, Holland, and Hainaut as well by mid 1434) was, however, 5.6 per cent weaker than the double groot (1.725 g silver) of June 1418, when Philip had promised the Flemish Estates not to alter the coinage again for 15 years.

58 Nevertheless, quotations for free gold rates on the Antwerp market (for various gold coinages) show an almost continuous rise from 1436; and by January 1443 both Philip and the Estates General were forced to recognize this market reality by prescribing a higher rate for the *rijder*, raising the bimetallic ratio to 11.32:1. From as early as October 1440 Philip had convoked meetings of the Estates to find solutions for the gold problem; and in January 1441, a petition from the nobility to increase the exchange rate on the Rhenish gold florin was rebuffed by the towns. In the next major change in the Burgundian coinage, in January 1454, with a new gold coinage, the bimetallic ratio was again raised, to 11.98:1. Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 2372; Van der Wee, *Antwerp Market*, I, 131-132 (Table XVI: Antwerp market free gold rates); Spufford, *Monetary Problems and Policies,* 114-117; Munro, *Wool, Cloth, and Gold*, 134-135; 149-150; Munro, 'Bullion Flows', 150-151 (Table 10).

59 Algemeen Rijksarchief België, Trésor de Flandre, Series I, no. 1123.

1423 settlement, should the coinage again be altered. Now the central question became: which gold noble? The most important noble then circulating was the English coin, 10 per cent lighter than the ancestor (Edward III's noble) that had provided the model for the Duke Philip the Bold's Flemish counterfeits of 1388-1390 (6.962 g vs. 7.735 g in pure gold). With the 1433 *renforcement,* though with a more pro-gold mint ratio, the English noble was officially valued at 92d (7s 0d *groot*). Obviously a wage of 46d *groot* would have been far too costly for the Kortrijk drapers. Most of the 1428 Flemish *nobles,* 11.1 per cent lighter than the 1390 version (6.799 g vs. 7.649 g in pure gold), were being reminted into the new *rijder* coins; but those still circulating were officially valued – in fact grossly undervalued – at 88d *groot* (7s 0d) or 44d for half-nobles, which happened to be the very wage awarded in 1428.[60] Negotiations revealed, however, that the Kortrijk fullers would in fact settle for less – for 42d *groot*. Even less, however, was what they received when Philip's councillors imposed a settlement, requiring the fullers to return to work at 39d *groot* per cloth. Indeed that was an arbitration award fully worthy of Solomon, for it was again precisely half way between the amount demanded by the fullers and that offered by the drapers.[61]

Evidently the fullers appealed this decision directly to Duke Philip. On 28 June 1434, he dictated a revised agreement that proved to be a lasting one: a new wage of 40d *groot* per broadcloth, the very same wage granted to the Ghent fullers in 1423.[62] The only further indications of industrial disputes involving Kortrijk fullers took place from May to August 1461; and that concerned not the wage itself but payment for *sticwerk* (small cloth pieces), in relation to full-sized cloths.[63] As Table 6 indicates, Kortrijk's fullers had benefited from the steep and prolonged deflation that ultimately followed the 1433-1434 *renforcement*, though one that was delayed until after 1440, because of supply shocks from the Anglo-Burgundian war (1436-1439), disastrous disruptions to the wool trade, plague, famine, and – not surprisingly – civil strife.

In the quarter-century following the restoration of peace, the mean composite Flemish price index fell 36.7 per cent, again with a decline in all three of its major components: from the peak of 140.17 in 1436-1440 to a trough of 88.71 in 1461-1465.[64] As also shown in Table 6, the purchasing power of the Kortrijk fullers' new wage would have risen considerably over these years: if it had remained at

60 See the monetary data in Munro, *Wool, Cloth, and Gold,* 198-210 (Tables C, E-F, and J-K).

61 Algemeen Rijksarchief België, Trésor de Flandre, Series I, nos. 1123-24 (17 Nov. and 1 Dec. 1433).

62 Algemeen Rijksarchief België, Trésor de Flandre, Series I, no. 1127. See also no. 1128, for 1 Oct. 1434, stipulating that the two journeymen (*cnapen*) be paid 15d groot each and the master, 'voor zine costen', 10d groot. The wage agreement was to endure so long as the coinage remained unchanged, according to Duke Philip's promise to the Estates, for another twenty years.

63 Algemeen Rijksarchief België, Trésor de Flandre, Series I, no. 1143 (14 August 1461): for *sticwerk* above 42 ells, 'dat zij daeraf betalen zullen dobbel ghelt van vollene...'

64 See Table 3. In this same period (for which 1451-1475=100), the grain-price index fell from 172.29 to 83.052 (51.8 percent); the dairy products index fell from 109.15 to 90.74 (16.9 percent); and the industrial products (textiles) index fell from 123.35 to 97.721 (20.8 percent).

40d *groot* per cloth, by 58 per cent, from a harmonic mean of 5.536 baskets in 1436-1440 to one of 8.748 baskets in 1461-1465. In Bruges, the master building craftsmen enjoyed the same percentage increase in real wages, but at a substantially higher level: from a harmonic mean of 13.049 baskets in 1436-1440 to one of 20.619 baskets in 1461-1465 (Table 4).[65] Thus, during this long period, they evidently all benefited from the combination of institutional wage stickiness and deep deflation, which was almost as steep and even more prolonged in England, despite retaining an unaltered coinage from 1412 to 1464.[66]

If such deflationary conditions fostered labour peace amongst the Flemish fullers, no such peace was to be found to the north, at Leiden, in Holland's major and still aggressively expanding drapery. Again, the Burgundian coinage *renforcement* and monetary unification, implemented in Holland by May 1434, had led to a fullers' strike or *uutgaenc* – literally 'walking out' of the town – under circumstances almost identical to those at Kortrijk the previous year. The Leiden *gerecht*, the draper-dominated civic government in which no fullers served, soon succeeded in breaking this strike: in compelling the fullers to return to work, to swear never again to strike or to desert the town, on pain of imprisonment or exile, to accept a wage reduction from 56d to 46d *groot*, and to affirm that it was a 'reasonable wage' (*een redelic loon*).[67] But indeed so it was. Ironically, the new wage of 46d *groot* not only equalled but was specifically defined as a half English gold noble, precisely the wage for which the Kortrijk fullers had for so long striven! The subsequent story of the Leiden fullers' strikes, however, can be found in many other excellent studies.[68]

65 These craftsmen had actually fared even better, since around the time of the 1434 *renforcement* most (if not all) came to receive a new summer daily wage of 12d *groot* while retaining the 10d wage as their winter wage, to give them a mean nominal wage of 11d. But see also Sosson, *Les travaux de la ville de Bruges*, 225-260, 300-309 (figures 12-17). He dates the change from about 1440, and applying to all; but my reading of the *werken* accounts in the annual Bruges *stadsrekeningen*, in Stadsarchief Brugge, does not fully verify that view.

66 From peak to trough, the Phelps Brown & Hopkins 'basket of consumables' price index (English CPI, 1451-75=100) fell by 26.2 percent: from a mean of 122.01 in 1436-1440 to one of 90.06 in 1476-1480. The English grain sub-index fell from 146.20 to 106.00; the meat and fish index, from 106.80 to 79.20; and the industrial index (fuel and textiles), from 114.48, in 1426-1430, to 104.08 in 1436-1440 and then to 98.53 in 1471-1475. The component sub-indexes in the Flemish CPI fell as follows, from 1436-1440 to 1461-1465: grains, from 172.29 to 83.05; dairy products, from 109.15 (115.13 in 1431-35) to 97.72; and industrial products (textiles) from 123.35 to 97.721. See Phelps Brown and Hopkins, 'Prices of Consumables', 28 ; Munro, 'Wage Stickiness', 219-227. In both England and the Low Countries, aggregate mint outputs of gold and silver had fallen to their lowest levels of the century from the early 1440s to the mid-1460s. See Munro, 'Bullion Flows', 131-148 (Tables 1-9); Munro, 'Central European Silver Mining Boom', 119-183; Challis, 'Mint Output', 682-685; Day, 'Great Bullion Famine', 42-49; Day, 'Monetary Contraction', 12-29; Spufford, *Monetary Problems and Policies,* 106-122; Spufford, *Money,* 339-362: that the 'bullion famine' reached 'its worst point in the early 1460s'.

67 The Leiden fullers' wage had been raised to 56d groot in June 1432. Posthumus, *Bronnen*, I, 128 (no. 111), 137-138 (no. 122), 142-143 (no. 130: 11 March 1435). On the Leiden government and the drapers see Brand, 'Urban Policy or Personal Government, 17-34; and Brand, *Over macht en overwicht.* See also the next note.

68 The Leiden fullers in fact struck again in 1447, 1455, 1470, and 1478: with full documentation in Posthumus, *Bronnen,* I, doc. nos. 187-190, 215, 279, 506-521, 529. For the most important sec-

7 Industrial Organization in the Late-Medieval Flemish Draperies: The Role of Foot-Fullers and the Absence of Fulling Mills

Three questions must surely arise from this study of contentious labour relations in the late-medieval Flemish (and Brabantine, and Dutch) woollen cloth industries. First, what precisely did the fullers do in the manufacture of high or luxury-grade woollen cloths? Second, why were they virtually the only textile artisans who came into such frequent conflict with their employers, the predominantly weaver-dominated group of drapers? Third, if fullers were so important and if their wages constituted a significant proportion of the value-added production costs, why did their employers not seek to eliminate them and the disruptive threat that they so often posed, by replacing them with readily available machines?

According to North America's leading historian of medieval Flanders, the fullers performed the 'least skilled of any of the large cloth-making occupations', involving nothing more than 'stamping fulling earth into textiles to soften the prickly texture of raw wool'.[69] In fact, they performed the final and most vital stage in the actual cloth-manufacturing process, which also commenced the finishing processes, and was thus crucial in determining both the durability and luxury-quality of the woollen broadcloth. When removed from the loom, a true woollen broadcloth (about 30.1 metres by 2.1 metres) was far too flimsy, fragile, and subject to damaging tears to be worn, in that condition, because its yarns, spun from very fine, short-stapled, curly, serrated wool fibres, were too weak and delicate. These woollen yarns, however, especially the carded wefts, did have excellent felting properties; and the essential task of fulling was to exploit those felting properties to give the cloth its required density, cohesion, and strength.[70]

By the later Middle Ages, traditional foot-fulling had become a very complex process; and as noted earlier fulling a standard size broadcloth required the part-time labour of the master fuller and the full-time labour of his two journeymen usually for three full days; but very high grade cloths, especially in the winter season, might require up to five days fulling. When the fullers had received the woven cloth from the weavers, they immersed it in a large wooden or stoneware vat filled with hot water and fuller's earth (*floridin)*, and then proceeded to scrub and scour it, to remove all the butter that had been applied earlier to protect the delicate short-fibred wools from damage and entanglement during the manufacturing

ondary literature on this topic, see: Posthumus, *Geschiedenis van de Leidsche lakenindustrie*, I, passim; Boone and Brand, 'Vollersproeren en collectieve actie in Gent en Leiden', 168-192; Boone, Brand, and Prevenier, 'Revendications salariales et conjoncture économique', 69-74; Brand, 'Twistende Leidenaars', 82-105; Brand, and Stabel, 'De ontwikkeling van vollerslonen', 203-222; and also Spading, 'Streikkämpfe des Vorproletariats', 171-175.

69 Nicholas, *Ghent in the Age of the Arteveldes,* 155.

70 True worsteds, in contrast, required little or no fulling: because their much longer-stapled, coarser, stronger, tightly twisted worsted yarns, warp and weft, produced a durable, fully manufactured cloth when woven. Mixed fabrics, with dry worsted warps and greased woollen wefts, did require some fulling, though much less than for true woollens. See Munro, 'Textile Technology', 693-711; Munro, 'Textiles, Textile Technology, and Industrial Organisation', 182-185, 190-191.

processes. The fuller's earth, in fact, combined with the grease to form a cleansing soap. While periodically removing and rinsing the cloth, and replenishing the vat with fresh hot water and chemicals, the fullers vigorously stamped and trod upon the cloth for the remainder of the three (or more) days. That combination of continuous treading, pounding, heat, moisture and chemicals compressed the warp and weft yarns tightly together and felted their scaly, curly wool fibres: i.e., forced them to contract, interlace, and mat together, reducing the total surface area by one half or more. Such compression, shrinkage, and felting gave the cloth far greater strength, homogeneity, durability, and density, thus explaining why it became so heavy. The fulled cloth was then hung to dry on a tentering frame, and tautly stretched by tenter-hooks on all four sides, to remove all wrinkles or creases from fulling and to ensure uniform length and width throughout the cloth; while doing this, the fullers also subjected it to a preliminary carding or 'raising' with teasels, to complete the felting process. The quality and durability of these fine broadcloths was in the hands – or rather, the feet – of the fullers.[71]

In late-medieval Flanders, Brabant, and Holland, the cost of fulling a full-sized woollen broadcloth represented, in fact, a quite significant proportion of the weaver-draper's value-added manufacturing costs: about 20 per cent, not including the fuller's share of finishing costs in tentering and teaselling.[72] The wool preparation accounted for about 4 per cent, combing and carding together for 12 per cent, spinning for 40 per cent, and weaving itself for the final 24 per cent of the pre-finishing manufacturing costs.[73]

71 For the Bruges *bellaert* of 1458, see documents in Delepierre and Willems, *Collection des keuren*, 42-43. After fulling, this broadcloth was reduced in area by 56 per cent, from 172 square ells to 75 square ells after fulling: in length, from 43 to 30 ells (from 30.1 m to 21.0 m); and in width from 4.0 to 2.5 ells (from 2.8 m – unusually wide – to 1.75m). Late-medieval Flemish woollens weighed about 0.455 kg. per square ell (0.49 m; and thus 0.929 kg per m^2), compared to the heaviest woollen overcoat today, about 0.295 per sq ell (or 0.602 kg per m^2). See Espinas, *La draperie dans la Flandre française*, II, 210-220, 729-732; De Poerck, *La draperie médiévale en Flandre*, I, 90-149; Munro, 'Textile Technology', 701-708; Munro, 'Textiles, Textile Technology, and Industrial Organisation', 204-210.

72 This percentage is calculated by combining similar data for cloth production at Leiden and Leuven in 1434-1435. At Leuven the total cost of producing a fully finished woollen cloth, 30 ells by 9 quarters, made from English Staple wools (probably Lincolnshire) was £4.953 groot Flemish: £3.094 for the wool (62.5 per cent), £0.892 for dyeing and dressing (18.0 per cent); and £0.967 or 232d groot for the other value-added manufacturing costs (19.5 per cent), Stedelijk Archief Leuven, Stadsrekeningen 1434-1435, no. 5058, fo. 34r. At Leiden, the price for two finished *voirwollen halvelaken* was almost the same, £4.900 groot Flemish. If total value-added manufacturing costs, apart from dyeing and finishing, were the same, then 19.52 per cent of £4.900 = £0.9566 = 230d groot; and 46d/230d = 20.0 per cent. Or, conversely, if the cost of fulling was the same at Leuven: then 46d/232d = 19.8 per cent. See Munro, 'Industrial Protectionism', 256 (Table 13.2); Munro, 'Medieval Scarlet', 52 (Table 13.2); Munro, 'Industrial Entrepreneurship', 377-388.

73 Calculated from data extrapolated from production costs at the Medici woollen workshops in the 1550s, producing similar woollens with similar techniques: in De Roover, 'A Florentine Cloth Firm', 32-33; and from Endrei, 'Manufacturing a Piece of Woollen Cloth', 14-23, where he estimates production hours in producing a 15th-century Flemish woollen as follows: 622 hours for carding/combing/spinning (60 per cent), 130 hours for weaving (13 per cent), 281 hours for finishing (27 per cent , with an estimate of 150 hours for foot-fulling – which may be too high). See the next note.

As indicated earlier, the industrial entrepreneurs responsible for this pre-finishing stage of cloth production were commonly known as 'drapers', and the vast majority of them, certainly in later fourteenth and fifteenth century Flanders, were master-weavers; and, as such, they were all members of the weaver's guild or *ambachten* (certainly in the *drie steden*). They did not, of course, themselves earn wages or receive fees, but rather earned profits: as the difference between their receipts in selling the semi-finished woollens to brokers, *upzetters*, and/or merchants; and their costs in buying wools (and other materials) and paying wages to their artisans. They organized production essentially by a 'putting out' (*Verlag)* system.[74] Having purchased either the raw or semi-prepared wools, they then 'put out' or handed them out and received them back in the various stages of yarn preparation: to wool-beaters (separating and sorting the fibres by length), the warp-combers, and the weft-carders (or weft-combers, as in Leiden), the warp-spinners (with distaff and rock-spindle), and the weft spinners (with spinning wheels), the loom-warpers, and the weft-winders. Many of these weaver-drapers no longer engaged in the actual weaving, but hired journeymen weavers to do this task. Most of these textile workers, except for the journeymen weavers, worked unsupervised in their homes; and for that reason were paid piece-work rather than time wages. The weaver-drapers evidently encountered few if any problems in controlling wages for these processes, especially if they acted, through their guild, as a collective monopsony in hiring these workers. Indeed, most of the yarn-producers, accounting for well over half the costs, were defenceless females, who supplied supplementary-household, and largely rural labour; and they certainly never enjoyed any guild protection.

In sharp contrast to their precarious position, the fullers constituted an exclusively male occupation, and, furthermore the only one within the medieval Flemish cloth industry composed of wage-earners who enjoyed guild protection.[75] The other two textile guilds were the shearers (or finishers) and the dyers (sometimes grouped as red- and blue-dyers), both of whom generally worked on specific commission for various merchants and brokers (and rarely for drapers); and they had the best knowledge of what colours, cuts, and styles were most demanded in the market place. Thus, they earned fees, not wages; and those fees were generally set by the town governments in which these guilds generally enjoyed some representation (certainly in the *schepenen* banks of the *drie steden*). Rarely would they come into conflicts with the weaver-drapers.

The fullers were thus the only employees who had the power to force wage-increases, by strikes if necessary, that posed a serious threat to the profit incomes of the weaver-drapers. Indeed, because they were so dependent upon the wool- and cloth merchants, especially for credit to finance their operations, their profit mar-

74 Holbach, 'Remarks on the Role of Putting-Out', 207-250; Van Werveke, *De koopman-ondernemer,* 5-26; Munro, 'Textiles, Textile Technology, and Industrial Organisation', 217-226.

75 In most Flemish towns, so long as the fullers remained free to nominate or elect their guild officials (*dekenen*, *gezwornenen*), the journeymen usually had an equal say with the masters in that selection. See the previous note.

gins were thin, often precarious, especially with the cloth industry's precipitous decline from the late 1370s.[76] Their plight, especially those in the *drie steden*, undoubtedly increased with the catastrophe of the Second Artevelde or Ghent Rebellion of 1379-1385 and then, from 1388 to 1392, with the ensuing Hanseatic embargo on the Bruges *kontor* and thus on the Flemish-Brabantine cloth trade, imposed to extract reparations for damages suffered during the Ghent revolt. As a consequence of these two disasters, both the English and Dutch cloth-export trades made very serious inroads into Baltic and German markets, previously a virtual preserve of the Flemish and Brabantine draperies.[77]

Finally, the weaver-drapers suffered from a potentially numerical disadvantage in bargaining with the fullers' guilds. While a master weaver and his assistant could together weave only about 20-25 broadcloths a year, a master-fuller and his two journeymen could process between 45 and 80 standard woollens a year (i.e., 15-27 per fuller).[78] Thus the Flemish cloth industry required fewer fullers than

76 See especially Espinas, *La draperie dans la Flandre française*, II, 603-606, 824-832; Van Werveke, *De koopman-ondernemer*, 5-26; Van Werveke, 'De economische en sociale gevolgen', 1-15; Van Werveke, 'Currency Manipulation in the Middle Ages', 115-127; Van Werveke, 'Landelijke en stedelijke nijverheid', 37-51; Van Werveke, 'Industrial Growth in the Middle Ages', 237-245. For banking and the drapers, see especially Murray, 'Cloth, Banking, and Finance', 24-31; De Roover, *Money, Banking and Credit*, 29-47, 293-330. For the decline from the 1370s, see Munro, 'Monetary Contraction and Industrial Change', 110-122, 138 (Table 1), 151 (Table 12); Munro, 'Anglo-Flemish Competition', 37-60; Munro, 'The Symbiosis of Towns and Textiles', 15-74; Munro, 'The West European Woollen Industries', 254-255, 283-286; Nicholas, *Ghent in the Age of the Arteveldes*, 135-144.

77 See Demuynck, 'De Gentse oorlog', 305-318; Malowist, 'L'expansion économique des Hollandais', 91-138; Blockmans, 'Der holländische Durchbruch in der Ostsee', 49-58; Blockmans, 'Economic Expansion of Holland', 41-58; De Boer, *Graaf en grafiek*, 211-232; Dollinger, *La Hanse*, 85-110; Dollinger, *The German Hansa,* 62-82; Jenks, *England, Die Hanse und Preussen*, I, 66-99; Lloyd, *England and the German Hanse*, 50-108; Hammel-Kiesow, *Die Hanse*, 61-68; publications of Munro in the previous note.

78 For woollen-weaving, see De Sagher, *Recueil de document*, II, 323-324 (no. 279): for Haubourdin, Flanders, in April 1593: two weavers operating one loom, and employing 27 persons, took 6 to 7 days to weave a cloth of 18-20 ells; and thus 13-14 days for a full cloth of 36-40 ells on the loom, with another 10-12 days for wool preparation and spinning, and 6-7 days for finishing. See Endrei, 'Manufacturing a Piece of Woollen Cloth', 27-11; he estimates that two weavers on a broadloom took about 12-13 days or about 130 hours to produce a cloth of 42 ells by 3 ells, thus producing about 20 cloths in a 240-day year, or 10 cloths per weaver. Fulling such woollens itself (apart from other aspects of cloth-processing by master-fullers) required from 3 to 5 days: and thus from 80 to 48 woollens in a 240-day work-year (26.7 to 16 cloths per fuller). But a master-fuller operating two to four vats obviously did not occupy himself full-time at any one vat. Many weaver-drapers also controlled several looms, though presumably worked at only one of them, or none at all, hiring other weavers. See also Endrei, *L'evolution des techniques du filage*, 110-126; Endrei, 'Changements dans la productivité de l'industrie lainière', 1291-1299; Endrei, 'La productivité et la technique dans l'industrie textile', 253-262; Endrei, 'The Productivity of Weaving', 108-119. See Munro, 'Textile Technology', 693-711; Munro, 'Textiles, Textile Technology, and Industrial Organisation', 194-204, 215-217; and Van Uytven, 'Technique, productivité, et production', 283-294; he suggest a maximum output of 42 cloths per loom (i.e., 21 per weaver), an improbably high estimate; and he also estimates an output of 34.3 woollens per fuller per year: 240 days per year/3.5 days per cloth/2 journeymen fullers. Production processes remained basi-

weavers, certainly fewer master fullers, in a guild ratio estimated at 6.5:10;[79] and most master-fullers worked for two weaver-drapers, who often found themselves competing for their services. Those circumstances and prolonged industrial decline help to explain why the weavers' guilds fought to gain increased power within the fourteenth-century town governments, especially, as Hans Van Werveke had argued, to impose urban wage controls on the cloth industry, above all for the fullers.[80] As noted earlier, the Ghent fullers were excluded from the town government during the 1360s.[81]

Given their plight, and especially from the 1370s to the early fifteenth century, one may well wonder why the Flemish (and Brabantine) weaver-drapers did not resolve their ongoing conflicts with the often troublesome fullers by displacing them with water-powered fulling mills, which had long been so successfully used elsewhere in western Europe, indeed in Italy, from the late tenth century?[82] Such mills could reduce the fulling process and costs from three days with two or more fullers to about nine hours for some smaller cloths or, for a full-sized broadcloth, to a single day, often with just one operator.[83] Quite explicit Florentine data for producing similar quality woollen broadcloths indicate that mechanical fulling

cally the same in the 18th century. According to an English Parliamentary commission report of the 1780s, two men and a boy (as weft-reeler) weaving a superfine broadcloth of 34 yards, with 70 lb. of wool, required 364 man-hours (= 14.5 days); and another 888 man-hours were spent in wool preparation, spinning, weft-reeling, and warping. Lipson, *History of the Woollen and Worsted Industries*, 256-260 (Appendix I). See also Mann, *The Cloth Industry in the West of England*, 316-328, for 18th-century cloth-production costs.

79 The Bruges militia records for the siege of Tournai in 1340 indicate 1,016 weavers, 669 fullers, 360 shearers and 123 dyers (in a militia of 7,234 men, within a population of ca. 35,000). See Prevenier, 'Bevolkingscijfers en professionele strukturen', 269-303; Van Houtte, *Bruges,* 40-42. Those for Ghent: 1,800 weavers, 1,200 fullers, and 2,139 from the 'small crafts'. Espinas and Pirenne, *Recueil de documents*, II, 614. For the 1356-1358 musters in Ghent, with a population of ca. 60,000, Nicholas, *Ghent in the Age of the Arteveldes*, 19 (Table 2.1) provides estimates of 3,539 weavers (26.4 per cent), 2,359 fullers (17.6 per cent), 1,590 other textile artisans (11.9 per cent), and 5,895 for the 'small guilds' (44.1 per cent). A Flemish weaver usually employed from six to eight spinners and the same number of warp-combers and weft-carders.

80 See Pirenne, *Early Democracies in the Low Countries,* 142-200; Nowe, *La bataille des éperons d'or*; Verbruggen, *De slag der Gulden Sporen*; Van Werveke, 'De economische en sociale gevolgen', 1-15; Van Werveke, *Jacques Van Artevelde*, 89-94; Van Werveke, *Gand,* 48-69; Van Werveke, 'Currency Manipulation in the Middle Ages', 115-127; Van Werveke, 'Het ambachtswezen te Gent', 363-367; Wyffels, *De oorsprong der ambachten in Vlaanderen;* Nicholas *Ghent in the Age of the Arteveldes,* 1-16, 130-134, 154-177; Nicholas, *Medieval Flanders*, 235-262; Munro, 'Urban Regulation and Monopolistic Competition', 41-52. See also Espinas and Pirenne, *Recueil de documents,* II, 615-617.

81 See above p. 162 and n. 28.

82 Malinama, 'First European Textile Machine', 115-128; Munro, 'Textile Technology', 693-711; Munro,'Textiles, Textile Technology, and Industrial Organisation', 204-210; Munro, 'Industrial Entrepreneurship', 377-388.

83 Mann, *Cloth Industry in the West of England*, 295-296, states that the duration of mechanical fulling varied from 9 to 36 hours, depending on the cloth dimensions and weight – about 24 hours for a full standard white broadcloth. See also Dickenson, 'Fulling in the West Riding', 127-141.

and tentering together accounted there for only 5 per cent of such value-added manufacturing costs – i.e., a saving of 75 per cent over traditional foot-fulling; and independent calculations for fulling-mills in sixteenth-century Brabant similarly indicate cost-savings of 70 per cent or more.[84] Furthermore, the renowned Eleanora Carus-Wilson long ago argued that water-powered fulling mills, which had come to dominate the English cloth industry by the later thirteenth or fourteenth century, gave the English their most powerful advantage in ultimately vanquishing the Flemish cloth industry.[85]

Carus-Wilson also provided the classic explanation for the supposed lack of fulling-mills in the medieval Low Countries, by observing that 'Flanders like Lincolnshire is a land of windmills, not water-mills'.[86] In fact, however, much of the Low Countries, rural and urban, including all the Flemish drapery towns, had long used water mills for grain-grinding and some industrial purposes (including paper-making);[87] and in the thirteenth and early fourteenth centuries, some draperies in towns of Namur and Brabant had indeed used fulling mills.[88] Flanders' *drie steden* evidently did not so in this period, probably because fulling-mills on their slow moving rivers would have required the much more costly overshot-wheels (compared to the simple undershot wheels on swift flowing rivers) and be-

84 Raymond De Roover, 'A Florentine Cloth Firm', 116-118: in the production of 71 woollen broadcloths in the Medici drapery (1556-1558), fulling and tentering cost 70 fl. 1s 0d, while total pre-finishing labour manufacturing costs were 1,381 fl. 17s 0d. As a proportion of the total price (43.33 florins), fulling amounted to 2.3 per cent. For Brabant, see Van Uytven, 'De volmollen', 61-76; Van Uytven, 'The Fulling Mill', 10-14.

85 Carus-Wilson, 'An Industrial Revolution', 183-210, and Carus-Wilson, 'The Woollen Industry', 409-414 (revised edn. 1987, pp. 669-690). Comparable English cost data are, however, inadequate for this period. For the thirteenth century, see Lloyd, 'Some Costs of Cloth Manufacturing', 335-336, indicating fulling costs ranging from 3.70s to 4.11s per cloth, but without indicating the form of fulling or total production costs per cloth, nor their size. Britnell, *Growth and Decline*, 61-62, also provides cloth manufacturing cost data for fourteenth-century Colchester, with about the same fulling costs, but without specifying the type of fulling (or whether it also included finishing).

86 Carus-Wilson, 'The Woollen Industry', 413; modified in the 2nd edn. (1987), 674, to read: 'is on the whole a land of windmills...,' in response to Van Uytven, 'The Fulling Mill', 2-3.

87 Examples of water mills in: Bruges: Stadsarchief Brugge, Stadsrekening 1291-1292, passim: *ad molendinum ad aquam*; Stadsrekening 1351-52, fo. 70-2ro: 'ter Watermuelene ten Wijgaerde'; also published in: Wyffels and Smet, *De rekeningen van de stad Brugge,* I; Ghent: Stadsarchief Ghent, Stadsrekening 1333-34, reeks n. 400:3(5), fo. 140ro: 'vanden neue watermolne ter Braembruggen boven den Temerkerke'; account published in Vuylsteke, *Gentsche Stads- en Baljuwsrekeningen,* 910; Ypres: Des Marez and De Sagher, *Comptes de la ville d'Ypres*, I, 294, no. 21 [1309-1310], 426-427 [1324-1325: 'des molins à yauwe à le porte de Messines'; Algemeen Rijksarchief België, Rekenkamer, reg. no. 38,635: Stadsrekening, July – Sept. 1406, fo. 2ro.: receipts from the 'watermuelen ter Meesenpoorte', £35 10s 0d *parisis*; Mechelen: Algemeen Rijksarchief, Rekenkamer, reg. no. 41,205, fo. 32r: (1372: 'van metsene aent molenhuys ... ane de watermolne, van witte stene..;' Kortrijk: Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1114 (July 1409): 'eenen molen ... ligghende by der stede van Curterike.' For Ghent water-mills, see also Boone, *Geld en macht*, 183-185.

88 Van Uytven, 'Fulling Mill', 2-4: in Brabant, Namur, Maastricht, and also Artois; but none has been found for Flanders itself.

cause their then densely populated towns would have imposed too high an opportunity cost, and thus rents, for urban locations.[89]

Carus-Wilson was also mistaken in offering a second argument: namely that fulling mills 'had been prohibited by the urban gilds, which were not less conservative than those of England, and very much more powerful'.[90] There is simply no evidence, however, of any guild or urban government bans on fulling-mills within medieval Flanders; and quite clearly the fullers' guild in the Flemish *drie steden* (let alone those in the Dutch and Brabantine towns) never had the power to impose any such bans, certainly not if the other textile guilds had believed that fulling-mills offered any advantage to guarantee survival.[91]

Indeed, the Brabantine and also some Norman draperies had abandoned their fulling mills during the early fourteenth century because they, along with the Flemish cloth industry, were then undergoing a radical transformation in their export-oriented cloth production:[92] to abandon the manufacture of the cheaper, lighter textiles (except some for domestic consumption), most of which had been sent to distant Mediterranean markets, in order to concentrate more and more on luxury cloth production. As I have contended in several earlier publications, the spreading stain of chronic or prolonged and highly disruptive warfare, from the 1290s and then continuing into the Hundred Years' War era (1337-1453), and government policies to finance such warfare, soon raised the transportation and general transaction costs to prohibitive levels for long-distance trade in the cheaper textiles. Furthermore, most of these cheaper fabrics were indistinguishable from competing products, so that northern producers had to act as 'price-takers' (with elastic demand) in Mediterranean markets and thus could not raise prices to cov-

89 Furthermore, many English urban draperies, especially those in East Anglia, with equally slow-moving rivers, did utilize fulling-mills either within or just outside town-walls. See in particular, for East Anglia, Britnell, *Colchester,* 13-21, 76-78; and Gervers, 'Textile Industry in Essex', 48-49, 69; for Bristol, see fullers' ordinances published in Bickley, *The Little Red Book of Bristol*, II, 10-12 (1346), 15-16 (1381), 75-79 (1406); for Worcester, see Tomlins and Raithby, *Statutes of the Realm*, III, 459-460 (25 Hen VIII c. 18, 1533-34); for Wiltshire, including the major town of Salisbury, see Ramsay, *Wiltshire Woollen Industry*, 18-20; for London: Riley, *Liber Custumarum,* I, 127-128 (1298); Sharpe, *Letter Book C*, 51-52 (1298), 52-53 *Letter Book D*, 239-240 (1311); *Letter Book H*, 37, 47-48 (1376). See also, Munro, 'Crisis of the English Textile Towns', 103-141.

90 Carus-Wilson, 'Industrial Revolution', 413.

91 It might be argued that, with fourteenth-century Flemish industrial organisation, individual weaver-drapers or master fullers or finishers lacked the capital or access to the capital necessary to build fulling-mills. But if these drapery towns could themselves build and operate or lease out water-mills for flour-milling and other purposes, they could have adapted them to fulling and similarly leased them to the industry.

92 Van Uytven, 'Fulling Mill', 4-6; see also Mollat, 'La draperie normande', 415-418. The Norman draperies reserved a very few such mills only for 'les gros draps bureaux, de grosses et mauvaises laynes'. The few fulling mills to be found in very minor *petites draperies* of Artois (Hesdin, St. Pol, Aire) and the Meuse Valley region (Huy, Liège, Verviers, Maastricht) evidently also produced only cheap fabrics for local or regional consumption. Espinas and Pirenne , *Recueil,* I, 28-33 (no. 10), 36-37 (no. 13: Aire: 1358); II, 689-690 (no. Hesdin: 1340); III, 336 (no. 706: St-Pol: 1383); IV, 69-70 (no. 938, Hesdin: 1379).

er rising costs. The production of luxury-quality woollens, on the other hand, permitted the northern draperies to sell a smaller number of fine cloths but at a much higher price that would cover these rising transaction costs. Furthermore, the essence of luxury production is product differentiation (with relatively inelastic demand), thus allowing the producer to succeed in being a 'price-maker' rather than a 'price-taker'. From about mid fourteenth century, the Flemish *drie steden* in particular had irrevocably chosen to concentrate on the upper segments of the European luxury market, while leaving the lower ranges to their new English and other competitors.[93]

Under such circumstances, fulling-mills could not possibly have assisted, let alone rescued, their cloth industries. In the first place, the surviving woollen draperies in the Low Countries, including the *nouvelles draperies,* firmly believed that the heavy oaken hammers of mechanical fulling, pounding the cloth 30-40 times a minute, impaired the very fine, short-fibred delicate wools (English wools in fact) and thus the luxury quality of their broadcloths.[94] Secondly, since the Flemish *drie steden* were necessarily selling their woollens at double or triple the price of English broadcloths,[95] their conversion to mechanized-fulling would have permitted only a very minimal reduction in the wholesale price, 3 per cent or less, gaining them few if any new customers, while risking the loss of far many more by undermining their reputation for the highest quality woollens.[96] The more successful members of the Flemish *nieuwe draperie*, in marketing generally lower-priced woollens, presumably would have derived a relatively greater advantage from mechanized fulling, especially with access to cheaper sites on the faster-flowing Leie (Lys) river. But woollens from Kortrijk, Wervik, and Menen,

93 See Munro, 'Industrial Transformations', 110-148; Munro, 'Anglo-Flemish Competition', 37-60; Munro, 'The Origins of the English New Draperies', 35-127; Munro, 'Textiles as Articles of Consumption', 275-288; Munro, 'The Symbiosis of Towns and Textiles', 1-74; Munro, 'Crisis of the English Textile Towns', 103-141; Munro, 'The Low Countries' Export Trade', 1-30; Munro, 'The New Institutional Economics', 1-47; Munro, 'The West European Woollen Industries', 241-255.

94 See Munro, 'Textile Technology', 705-711; Mollat, 'La draperie normande', 418; Van Uytven, 'Fulling Mill', 5-6; Hall and Russell, 'What About the Fulling Mill?', 113-119; Scott, 'Early Cloth Fulling', 30-52; Mann, *Cloth Industry of the West of England.,* 293-299, stating that 'cloths could easily be damaged in [mechanical] fulling' (296).

95 For fourteenth century cloth prices, see Munro, 'Textiles as Articles of Consumption', 275-288; Munro, 'Industrial Transformations', 143-148 (Appendix 4.1); Munro, 'Origins of the English New Draperies', 42-44 (Table 3); for the 15th century, see Munro, 'Industrial Protectionism', 257-267 (Tables 13.2 – 13.5); Munro, 'Medieval Scarlet', 40-51 (Tables 3.5 -3.11); Munro, 'European Woollen Industries', 318-324 (Table 5.10).

96 See n. 72 above and Table 6-8; and also Munro, 'Industrial Entrepreneurship', 377-388. The 46d *groot* cost in fulling two *voirwollen halvelakenen* of Leiden in 1435 represented 20 per cent of the value-added manufacturing costs but only 4.31 per cent of the wholesale price of £4.448; and a cost-savings of 75 per cent from mechanized fulling would thus represent only 3.23 per cent of that price. In the mid-1430s a Ghent *dickedinnen* broadcloth was priced at £7 0s 0d *groot*; and if its rate for fulling had remained the same in 1435, and was the same for *dickedinnen* as for fulling *maerclakenen,* at 40d per cloth, that would have represented just 2.73 per cent of the wholesale price; a 75 per cent cost-savings, just 2.0 per cent (Table 7).

still leaders of this group, were still about 50 or 60 per cent more expensive than comparable English broadcloths.[97] Indeed, striving to emulate the luxury-quality woollens of the *drie steden*, they and fellow members of the *nieuwe draperie* maintained traditional foot-fulling until the sixteenth century,[98] when international economic conditions again favoured export-oriented production of cheaper woollens and semi-worsteds in the Low Countries.[99]

8 Duke Philip the Good's Monetary Policies, 1419-1434: their ultimate consequences for the Low Countries woollen cloth industries

Long before then, however, not only the traditional 'old' draperies of Flanders (*drie steden*) and Brabant (Brussels, Leuven, and Mechelen) but also the generation of the *nieuwe draperie* led by Kortrijk and Wervik were at best ghostly shadows of their former selves. Their final and ultimate downfall can indeed be largely blamed upon the unintended consequences of Duke Philip the Good's monetary policies of the later 1420s. By engaging in such drastic coinage debasements, which also, as indicated above, including minting imitations of the prized English gold noble, Duke Philip provoked his erst-while ally England into a mutually destructive monetary retaliation. It did not come in the form of mint manipulations but instead in legislation that imposed extremely onerous payment regulations at the Calais Staple, the obligatory agency for marketing wools, whose chief customers were indeed the Low Countries' draperies. As also indicated above, the Low Countries' draperies, by having so fully concentrated upon the

97 In the 1430s, prices for Wervik woollens sold at Bruges ranged from £3.083 to £3.900 to £5.750 *groot* (= £2.792 to £5.209 sterling); Kortrijk woollens, from £3.083 to £3.500 groot (= £2.793 to £3.170 sterling); Menen woollens, from £4.600 to £6.000 *groot* (= £4.157 to £5.435 sterling). Munro, 'Industrial Protectionism', 263-264 (Table 13.3); Munro, 'Industrial Transformations', 143-148 (Table 4.1); Munro, 42-44 (Table 3); Munro, 'European Woollen Industries', 318-324 (Table 5.10).

98 For similar reasons, the leading *nouvelles draperies* were reluctant to give up English wools when they became far too expensive and switch to much cheaper, though good quality Spanish *merino* wools. In the 1450s, the Wervik drapery required its members yearly to swear an oath to use none but English wools. De Sagher, *Recueil,* III, 520-521 (no. 577: 1458), 527-531 (nos. 581-4: 1463). See also Munro, 'Origins of the English New Draperies', 45-52; Munro, 'Textiles, Textile Technology, and Industrial Organisation', 288-290.

99 By the mid sixteenth-century, fulling-mills were again spreading, quite rapidly, throughout the Low Countries: first and foremost in the so-called *nouvelles draperies* of the Leie Valley, now led by Armentières, which collectively had become Flanders' major cloth industry; and also in Bruges, Ypres, Amiens, Brussels, Leuven, Mechelen, the Norman towns, and finally also (by 1585) at Leiden. See Van Uytven, 'De volmollen', 61-76; Van Uytven, 'Fulling Mill', 1-14; and in the Norman towns: Mollat, 'La draperie normande', 403-421; see also Munro, 'Textile Technology', 705-711. For fulling mills in Brussels: Stadsarchief Brussel, no. 1436, fo. 48-9ro (June 1535); fulling mills in Leuven: Stedelijk Archief Leuven, no. 718, fo. 27ro (October 1556); in Ypres: Diegerick, *Archives de la ville d'Ypres,* V, 254-256 (no. 1664: March 1543); at Armentières: De Sagher, *Recueil de documents,* I, 316 (no. 100: June 1562) and 322-323 (no. 101: August 1564); and for Leiden, Posthumus, *Bronnen*, III, 183 (no. 158: August 1590).

export-oriented manufacture of luxury quality woollens, had made themselves dangerously dependent upon the finer English wools, the indisputable *sine qua non* for luxury cloth production. In turn, as also noted above, the English crown had much earlier exploited that dependency by imposing increasingly more onerous wool-export taxes. Now it set about to kill the goose that laid the proverbial golden eggs, with the infamous Calais Staple Partition and Bullion Ordinances.

From their original enactment in 1429, and through various amended forms until their ultimate revocation in 1473, these ordinances, in essence, placed control of the wool trade under a small clique of Calais Staplers (a cartel, in effect), who were required to raise wool prices sharply, to deny all sales credit, and to demand full payment in English coin and also bullion for delivery to the Calais mint. These were enormously costly burdens that few weaver-drapers in the Low Countries, or merchants, except the seafaring Dutch merchants, could readily sustain, for all merchants depended upon using credit. Several of my publications have sought to demonstrate how this mutually destructive set of monetary policies brought ultimate ruin to both the English wool trade and most draperies in the southern Low Countries by the 1470s.[100]

In the sixteenth century, those textile manufacturing industries that superseded them were composed of two new branches: a very different generation of *nouvelles draperies* that relied on the much improved Spanish *merino* wools; and the recently revived *sayetteries*, producing cheap, light, semi-worsted style cloths, made from various other coarse wools (neither English nor Spanish). And it was these two branches of textile manufacture, the former especially, that did indeed profitably utilize fulling mills.[101]

Summary

The late Prof. Hans Van Werveke, in two very contentious articles, had contended that the monetary policies of Count Lodewijk van Male (Louis de Male) 'had checked, for some time at least, the decay of the Flemish cloth industry' by allowing its industrial entrepreneurs (weaver-drapers) to pay their artisans in continually debased silver coins, thereby reducing their real costs and sales prices, which provided the only means by which 'it could hold out against foreign competition' namely the growing threat from the English cloth trade. Although he subsequently wrote an important article on the 1390 monetary reform of the count's son-in-law and successor, Duke Philip the Bold, neither he nor anyone

100 See Munro, *Wool, Cloth, and Gold*, 65-186; Munro, 'Anglo-Flemish Competition', 37-60; Munro, 'Symbiosis of Towns and Textiles', 1-74; Munro, 'European Woollen Industries', 286-295; Lloyd, *English Wool Trade*, 257-287; Power, 'Wool Trade', 72-90.

101 See Munro, 'Origins of the English New Draperies', 35-127; Munro, 'Low Countries Export Trade', 1-30; Munro, 'The New Institutional Economics', 1-47; Van der Wee, 'Structural Changes', 203-21; Van der Wee, 'The European Woollen Industries, 1500 -1750' (forthcoming); *La draperie-sayetterie d'Hondschoote*; Coornaert, 'Draperies rurales', 60-96.

else has examined the possible impact of that entirely contrary monetary policy, in strengthening the coinage, upon the Flemish cloth industry, at the very time that the English and Dutch cloth trades had taken advantage of the damages inflicted by the Ghent Revolt of 1379-1385 and the Hanseatic Embargo of 1388-1392, to invade Baltic and German markets. This study focuses upon the consequences of that policy in aggravating the ongoing conflict in the industry's labour relations: in particular the strife between the weaver-draper entrepreneurs and the fullers, the one group of wage-earning employees that enjoyed some protection from a guild organization. This 1390 monetary reform had necessitated a 25-percent reduction in wages, along with other prices; and such wage cuts were bitterly resented, with threats of strikes from the fullers of Kortrijk and Wervik. While compulsory arbitration from the ducal Council of Flanders did impose settlements, and new wages that endured unchanged until the 1420s, it unwittingly set the stage for subsquent strikes, especially in the case of Kortrijk, by specifying wages in gold coins as well as in silver coins, with a fixed bimetallic ratio. When the duke's grandson, Philip the Good, resumed drastic coinage debasements in the 1420s (to help finance his wars), and in a manner that drove up the relative value of gold coins, the Kortrijk fullers then demanded to be paid in gold; and with the drapers' refusal and a sharp rise in the cost of living, they and the Ghent fullers engaged in disruptive strikes. But the most serious consequence of Philip the Good's monetary policy was to provoke an English retaliation in the form of bullionist payment regulations at the Calais Wool staple, where the Flemish drapers secured almost all their wools. Those onerous regulations and the conflicts that followed doomed both the English wool trade and the Flemish cloth industry to a sudden and irredeemable decline.

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Table 1.
Official Flemish Coined Values of Gold and Silver per Kilogram of Pure Metal, Bimetallic Ratios, and Official Exchange Rates on the Flemish Gold Noble, 1373-1454

Date	Coined Value of Gold in £ groot Flemish per kg	Coined Value of Silver in £ groot Flemish per kg	Bimetallic Gold: Silver Mint Ratios (Ratio of the Coined Values per kg)	ExchangeRate on Flemish Noble in d groot Flemish	Grams of Fine Gold in the Flemish Noble
1373 Jun	39.530	3.739	10.57		
	39.896	3.739	10.67		
1380 Jan	41.692	4.121	10.12		
	42.598	4.121	10.34		
1383 Sep	45.570	4.300	10.60		
1384 Sep	35.120	3.553	9.89		
1386 Apr	41.727	4.050	10.30		
1386 Oct	41.727	4.107	10.16		
1387 Apr	49.811	4.910	10.14		
1388 Oct	55.566	5.337	10.41	102d	7.649
1390 Jan	39.223	4.050	9.68	72d	7.649
1391 Jan	39.223	4.086	9.60	72d	7.649
1393 Jun	39.223	4.050	9.68	72d	7.649
1407 Jul: Proposed	39.636	4.050	9.79		
1409 Aug	33.443	3.482	9.60	60d	7.649
1416 Dec	37.554	4.263	8.81	60d	6.657
1418 Jun	47.290	4.832	9.79	76d	6.657
1422 Apr				84d	6.657
1425 Jun:F	56.784	4.832	11.75	92d	6.751
1425 Jul:N	56.784	4.519	12.57		
1426 Jul:N	64.412	4.558	14.13		
1426 Nov:F	64.412	4.832	13.33		
1427 Sep:F	50.672	4.832	10.49	84d	6.907
1428 Jun:N	62.054	5.116	12.13		
1428 Nov:F	58.835	5.474	10.75	96d	6.799

Table 1, continued

Date	Coined Value of Gold in £ groot Flemish per kg	Coined Value of Silver in £ groot Flemish per kg	Bimetallic Gold: Silver Mint Ratios (Ratio of the Coined Values per kg)	ExchangeRate on Flemish Noble in d groot Flemish	Grams of Fine Gold in the Flemish Noble
1429 Feb:N	64.052	5.525	11.59		
1429 Jun:N	65.834	5.756	11.44		
1429 Sep:B	64.248	5.453	11.78		
1430 Jan:N	65.834	5.756	11.44		
1430 May:B	64.248	5.453	11.78		
1430 Dec:N	65.985	5.756	11.46		
1431 Mar:B	64.722	5.453	11.87		
1431 Mar:N	65.985	5.756	11.46		
1431 Apr:N	66.504	5.815	11.44		
1431 Sep:N	67.031				
1431 Dec:N	70.381	6.139	11.46		
1432 Oct:N	73.110	6.139	11.91		
1433 May:N	77.176	6.634	11.63		
1433 Aug:N	57.883	4.975	11.63		
1433 Oct	55.591	5.116	10.87	88d * 92d	6.799 * 6.962
1443 Mar	57.907	5.116	11.32		
1454 Jan	61.286	5.116	11.98		

* The English noble of 1411-64
F: Flanders
N: Namur
B: Brabant
From October 1433: the Burgundian Low Countries

Sources:
Exchange rates: Spufford, *Handbook of Medieval Exchange*, 215-221 (with some extrapolations from values for virtually identical Genoese genoins or florins and Venetian ducats).
Mint and monetary data: Munro, 'Mint Policies', 71-116; Munro, 'Bullion Flows', 97-158; Munro, *Wool, Cloth, and Gold,* 193-211.

Table 2.
Prices of Ghent's Woollen Cloths:Dickedinnen Broadcloths and Small Cloths*in Ponden Groot (Livres Gros) Flemish and Florentine Florins:

1340-1412

Year	Dickedinnen Broadcloth in £ groot Flemish	Dickedinnen Broadcloth in Florins	Dickedinnen Small cloth in £ groot Flemish	Dickedinnen Small cloth in Florins	Exchange Rate of the Florin in d groot Flemish	Grams of silver in the d groot
1340	2.350	37.6	1.150	18.4	15.000	2.908
1349	2.613	37.3	1.363	19.4	16.833	2.067
1353			1.704	21.4	19.083	1.835
1354			1.979	23.7	20.000	1.747
1361	4.958	54.1	2.583	28.2	22.000	1.629
1367	5.163	50.4	2.796	27.3	24.583	1.372
1369	5.592	49.0	3.225	28.2	27.416	1.229
1370	5.913	44.3	3.333	25.0	32.000	1.173
1377	6.000	45.0	3.550	26.6	[32.000]	1.114
1378	7.600	57.0	3.667	27.5	[32.000]	1.114
1380	7.500	56.3	4.000	30.0	[32.000]	1.011
1382	7.500	56.3	4.000	30.0	[32.000]	1.011
1389					42.500	0.781
1390	5.958	45.4			31.500	1.018
1391	5.538	42.2			31.500	1.008
1402	5.667	41.2			33.000	1.018
1403	6.000	43.6			33.000	1.018
1412	5.700	41.5			33.000	1.182

* dickedinnen broadcloths purchased annually for the aldermen (schepenen) and dickedinnen small cloths purchased for the civic clerks (clerken). The *dickedinnen* were the most important broadcloth that Ghent exported to foreign markets.

Sources:
Cloth prices: from cloth purchases for civic officials in Stadsarchief Gent, Reeks 400:5 – 10, Stadsrekeningen 1347/48 to 1412/13
Exchange rates, mint and monetary data: see the sources for Table 1.

Table 3.
Prices of and Price-Relatives for the Flemish 'Basket of Consumables' in d groot Flemish and in index numbers for grains, dairy products, and textiles, and for the entire basket, in quinquennial means, 1371-75 to 1466-70: mean of 1451-75 = 100

Years (5)	Grains Total Value in d groot Flemish	Dairy Products Total Value in d groot Flemish	Textiles Total Value in d groot Flemish	Basket of Consumables Total Value in d groot Flemish	Grains Group Index 1451-75= 100.000 56.354d groot Flemish	Dairy Group Index 1451-75= 100.000 44.665d groot Flemish	Textiles Group Index 1451-75= 100.000 25.276d groot Flemish	Commodity Basket Index 1451-75= 100.000 126.295d groot Flemish
1371-75	68.696	50.186	26.638	145.519	121.901	112.359	105.388	115.222
1376-80	59.508	54.208	27.307	141.024	105.597	121.366	108.038	111.662
1381-85	62.440	60.617	27.477	150.534	110.799	135.714	108.711	119.193
1386-90	74.807	54.784	27.922	157.514	132.745	122.655	110.470	124.719
1391-95	46.663	44.324	20.797	111.784	82.803	99.235	82.282	88.510
1396-00	52.259	41.151	19.998	113.407	92.733	92.132	79.118	89.796
1401-05	53.643	36.034	22.133	111.810	95.190	80.675	87.565	88.531
1406-10	65.192	40.670	27.077	132.939	115.682	91.056	107.127	105.261
1411-15	52.776	41.279	26.315	120.370	93.652	92.417	104.114	95.309
1416-20	62.415	46.754	26.447	135.616	110.755	104.677	104.636	107.381
1421-25	63.542	51.094	27.044	141.680	112.756	114.392	106.998	112.182
1426-30	69.220	51.147	28.375	148.741	122.830	114.511	112.262	117.773
1431-35	74.904	51.423	29.662	155.989	132.917	115.130	117.353	123.512
1436-40	97.091	48.753	31.178	177.022	172.289	109.153	123.350	140.166
1441-45	62.668	50.502	30.180	143.350	111.205	113.067	119.403	113.504
1446-50	60.695	49.155	29.055	138.904	107.703	110.051	114.952	109.984
1451-55	53.707	45.853	27.875	127.434	95.302	102.660	110.282	100.902
1456-60	74.315	47.918	26.612	148.845	131.873	107.281	105.288	117.855
1461-65	46.803	40.528	24.700	112.030	83.052	90.737	97.721	88.705
1466-70	52.607	45.204	24.089	121.900	93.351	101.206	95.304	96.520

Table 3, continued.
Composition of the Flemish 'Basket of Consumables', for the base period 1451 -75 =100

Commodity	Unit	Quantity	Mean Value in 1451-75 in d groot Flemish	Mean Value in 1451-75 in d groot Flemish	Percentage of total basket	Percentage of total basket
Wheat	litres	45.461	13.279		10.51%	
Rye	litres	36.369	7.062		5.59%	
Barley	litres	181.84	2.867		2.27%	
Peas	litres	24.243	7.341		5.81%	
Sub-total grains				30.549		24.19%
Drink: Barley malt	litres	163.659	25.805	25.805	20.43%	20.43%
Butter	kilograms	13.608	36.087		28.57%	
Cheese	kilograms	13.608	8.578		6.79%	
Sub-total dairy				44.665		35.37%
voeringlaken	metres	0.525	8.468		6.70%	
Ghent strijpte laken for musicians	metres	0.700	16.808	13.31%		
Sub-total textiles				25.276		20.01%
Basket total			126.295	126.295	100.00%	100.00%

Sources:
Verlinden, Crayebeckx, and Scholliers, *Dokumenten voor de geschiedenis van prijzen,* I, II.i, II.ii; and Stadsarchief Gent, Stadsrekeningen, Reeks no. 400 series, for textile prices.

Table 4.
Wages of Master Building Craftsmen, their Journeymen, and of Policemen in Bruges in pence (d) groot Flemish and in Flemish commodity baskets with Consumer Price, Nominal Wage, and Real Wage Indexes (1451-75=100) in quinquennial means, 1371-75 to 1466-70

Years (5)	Basket of Consumables Total Value in d groot	Commodity Basket Price Index 1451-75=100 126.295d groot Flemish	Wages of Master Building Craftsmen in d groot Flem. Best estimate of median wage	Bruges Nominal Wage Index Mean Mode 1451-75=100 [11d]	Bruges Real Wage Index 1451-75=100 arithmetic mean	Bruges Real Wage Index 1451-75=100 harmonic mean
1371-75	145.519	115.222	8.000	72.727	63.684	63.120
1376-80	141.024	111.662	8.800	80.000	72.090	70.520
1381-85	150.534	119.193	8.800	80.000	68.151	65.898
1386-90	157.514	124.719	10.867	98.788	80.335	77.375
1391-95	111.784	88.510	9.000	81.818	93.500	92.439
1396-00	113.407	89.796	9.850	89.545	100.219	99.731
1401-05	111.810	88.531	10.000	90.909	103.150	102.687
1406-10	132.939	105.261	10.000	90.909	88.279	86.366
1411-15	120.370	95.309	10.000	90.909	96.376	95.384
1416-20	135.616	107.381	10.000	90.909	86.463	84.660
1421-25	141.680	112.182	10.000	90.909	81.287	81.037
1426-30	148.741	117.773	10.000	90.909	77.518	77.190
1431-35	155.989	123.512	10.800	98.182	80.106	79.378
1436-40	177.022	140.166	11.000	100.000	77.154	71.344
1441-45	143.350	113.504	11.000	100.000	89.960	88.102
1446-50	138.904	109.984	11.000	100.000	91.907	90.922
1451-55	127.434	100.902	11.000	100.000	99.326	99.106
1456-60	148.845	117.855	11.000	100.000	85.247	84.850
1461-65	112.030	88.705	11.000	100.000	113.700	112.733
1466-70	121.900	96.520	11.000	100.000	103.714	103.605

Table 4, continued.

Years (5)	Masters Real Wage in Commodity Baskets Annual: 210 days arithmetic	Masters Real Wage in Commodity Baskets Annual: 210 days harmonic	Journeymen Building Craftsmen Daily Wage in d groot Flemish	Journeymen Nominal Wage Index 1451-75= 100 (5.5 d)	Journeymen Real Wage Index 1451-75= 100 arithmetic mean	Journeymen Real Wage Index 1451-75= 100 harmonic mean
1371-75	11.648	11.545	4.000	72.727	63.684	63.120
1376-80	13.186	12.898	4.400	80.000	72.090	70.520
1381-85	12.465	12.053	4.400	80.000	68.151	65.898
1386-90	14.694	14.152	5.433	98.788	80.335	77.375
1391-95	17.102	16.908	4.500	81.818	93.500	92.439
1396-00	18.331	18.241	4.925	89.545	100.219	99.731
1401-05	18.867	18.782	5.000	90.909	103.150	102.687
1406-10	16.147	15.797	5.000	90.909	88.279	86.366
1411-15	17.628	17.446	5.000	90.909	96.376	95.384
1416-20	15.814	15.485	5.000	90.909	86.463	84.660
1421-25	14.868	14.822	5.000	90.909	81.287	81.037
1426-30	14.178	14.118	5.000	90.909	77.518	77.190
1431-35	14.652	14.519	5.400	98.182	80.106	79.378
1436-40	14.112	13.049	5.500	100.000	77.154	71.344
1441-45	16.454	16.114	5.500	100.000	89.960	88.102
1446-50	16.810	16.630	5.500	100.000	91.907	90.922
1451-55	18.167	18.127	5.500	100.000	99.326	99.106
1456-60	15.592	15.519	5.500	100.000	85.247	84.850
1461-65	20.796	20.619	5.500	100.000	113.700	112.733
1466-70	18.970	18.950	5.500	100.000	103.714	103.605

Table 4, continued

Years (5)	Journeymen Builders annual income in Flemish commodity baskets arithmetic mean	Journeymen Builders annual income in Flemish commodity baskets harmonic mean	Policemen Daily Wage in d groot Flemish	Policemen Annual Value of the Wage (365 days) in d groot Flemish	Policemen Annual Wage in Commodity Baskets arithmetic mean	Policemen Annual Wage in Commodity Baskets harmonic mean
1371-75	5.824	5.772	5.000	1825.000	12.654	12.541
1376-80	6.593	6.449	5.200	1898.000	13.512	13.366
1381-85	6.233	6.027	6.000	2190.000	14.675	14.548
1386-90	7.347	7.076	6.000	2190.000	14.016	13.904
1391-95	8.551	8.454	6.000	2190.000	19.816	19.591
1396-00	9.165	9.121	5.400	1971.000	17.447	17.283
1401-05	9.433	9.391	5.000	1825.000	16.396	16.322
1406-10	8.073	7.898	5.000	1825.000	14.032	13.728
1411-15	8.814	8.723	5.000	1825.000	15.319	15.162
1416-20	7.907	7.742	5.000	1825.000	13.744	13.457
1421-25	7.434	7.411	5.000	1825.000	12.921	12.881
1426-30	7.089	7.059	5.000	1825.000	12.322	12.270
1431-35	7.326	7.259	5.000	1825.000	11.789	11.700
1436-40	7.056	6.525	5.000	1825.000	11.149	10.309
1441-45	8.227	8.057	5.000	1825.000	12.999	12.731
1446-50	8.405	8.315	5.000	1825.000	13.281	13.139
1451-55	9.084	9.063	5.000	1825.000	14.353	14.321
1456-60	7.796	7.760	5.000	1825.000	12.318	12.261
1461-65	10.398	10.310	5.000	1825.000	16.430	16.290
1466-70	9.485	9.475	5.000	1825.000	14.987	14.971

Sources: For wages: Stadsarchief Brugges, Stadsrekeningen 1370/61 to 1469/70; for prices: see sources for Table 3.

Table 5
Ghent: Fullers' Wages, Nominal and Real, 1373 – 1430: in d groot Flemish and in units of a Flemish 'basket of consumables' in quinquennial means (1451-75 = 100)

Years: 5 year means	Nominal Wage in d groot Flemish 3 days: Master & 2 journeymen	Nominal Wage in d groot Flemish journeymen per day	Income for 210 days per fuller journeyman in d groot Flemish	Income for 210 days per fuller journeyman in £ groot Flemish	Value of Commodity Basket in d groot Flemish	Price Index 1451-75 = 100	No. of Commodity Baskets for fullers' annual wage arithmetic mean	No. of Commodity Baskets for fullers' annual wage harmonic mean
1373-75	45.000	5.250	1102.500	4.594	144.679	114.556	7.680	7.620
1376-80	45.000	5.250	1102.500	4.594	141.024	111.662	7.834	7.818
1381-85	45.000	5.250	1102.500	4.594	150.534	119.193	7.388	7.324
1386-90	42.400	4.947	1038.800	4.328	157.514	124.719	6.669	6.451
1391-95	32.000	3.733	784.000	3.267	111.784	88.510	7.094	7.014
1396-00	32.000	3.733	784.000	3.267	113.407	89.796	6.955	6.913
1401-05	32.000	3.733	784.000	3.267	111.810	88.531	7.044	7.012
1406-10	32.000	3.733	784.000	3.267	132.939	105.261	6.028	5.897
1411-15	32.000	3.733	784.000	3.267	120.370	95.309	6.581	6.513
1416-20	32.000	3.733	784.000	3.267	135.616	107.381	5.904	5.781
1421-25	36.800	4.293	901.600	3.757	141.680	112.182	6.374	6.299
1426-30	40.000	4.667	980.000	4.083	148.741	117.773	6.617	6.589

Sources: Wages: Espinas and Pirenne, *Recueil de documents,* II-III; Rijksarchief van Oost-Vlaanderen te Gent, Oostenrijks Fonds; Algemeen Rijksarchief, Trésor de Flandre, Series I. For prices, see Table 3.

Table 6.
Kortrijk: Fullers' Wages, Nominal and Real: 1361-1475 in d groot Flemish and in units of a Flemish 'basket of consumables' in quinquennial means (1451-75 = 100). Fullers' Wages: for master fuller and his two journeymen in fulling one broadcloth in three days (Daily Wages and Annual Incomes for journeymen fullers only)

Years (5 year means)	Fullers' Fee in d groot Flemish Master and 2 Journeymen	Journeymen Fuller's Pay for One Cloth in d groot Flem	Journeymen wage per day in d groot Flemish	Journeymen Annual Wage Income (for 210 days) in d groot Flemish	Value of a Basket of Consumables in d groot Flemish	Flemish Price Index 1451-75=100	Journeymen Fuller's Annual Wage in commodity baskets: arithmetic means	Journeymen Fuller's Annual Wage in commodity baskets: harmonic means
1371-75	25.500	8.925	2.975	624.750	145.519	115.222	3.352	3.442
1376-80	41.000	14.350	4.783	1004.500	141.024	111.662	7.138	7.123
1381-85	41.000	14.350	4.783	1004.500	150.534	119.193	6.731	6.673
1386-90	40.000	14.000	4.667	980.000	157.514	124.719	6.280	6.197
1391-95	36.000	12.600	4.200	882.000	111.784	88.510	7.981	7.890
1396-00	36.000	12.600	4.200	882.000	113.407	89.796	7.824	7.777
1401-05	36.000	12.600	4.200	882.000	111.810	88.531	7.924	7.888
1406-10	36.000	12.600	4.200	882.000	132.939	105.261	6.782	6.635
1411-15	36.000	12.600	4.200	882.000	120.370	95.309	7.404	7.327
1416-20	38.400	13.440	4.480	940.800	135.616	107.381	7.127	6.854
1421-25	38.400	13.440	4.480	940.800	141.680	112.182	6.668	6.595
1426-30	39.200	13.720	4.573	960.400	148.741	117.773	6.446	6.432
1431-35	42.200	14.770	4.923	1033.900	155.989	123.512	6.671	6.616
1436-40	40.000	14.000	4.667	980.000	177.022	140.166	5.987	5.536
1441-45	40.000	14.000	4.667	980.000	143.350	113.504	6.981	6.836
1446-50	40.000	14.000	4.667	980.000	138.904	109.984	7.132	7.055
1451-55	40.000	14.000	4.667	980.000	127.434	100.902	7.707	7.690
1456-60	40.000	14.000	4.667	980.000	148.845	117.855	6.615	6.584
1461-65	40.000	14.000	4.667	980.000	112.030	88.705	8.823	8.748
1466-70	40.000	14.000	4.667	980.000	121.900	96.520	8.048	8.039

Source:
Wages: Espinas and Pirenne, *Recueil de documents,* II – III; Rijksarchief van Oost-Vlaanderen te Gent, Oostenrijks Fonds; Algemeen Rijksarchief, Trésor de Flandre, Series I. Prices: see Table 3.

Table 7
Prices of Ghent Dickedinnen Broadcloths, Their Values in Units of the Flemish Commodity Basket, the No. of Days' Wages of a Bruges Master Mason to Buy One, and Fulling Costs as Percentage of the Wholesale Cloth Price in Quinquennial Means, 1376-80 to 1466-70

Years (5)	Price of First Quality Ghent Dickedinnen Broadcloths in £ groot Flemish	Value of Flemish Commodity Basket in d groot Flemish	Value of Ghent Dickedinnen in Flemish Commodity Baskets	Wages of Master Building Craftsmen in Bruges in d groot Flemish	No. of Days Wages for Master to buy one Dickedinnen	Fullers' Fee for One Broadcloth in Three Days in d groot	Fulling Costs as per cent of Dickedinnen Price
1376-80	6.890	141.024	11.772	8.800	188.580	45.000	2.76%
1381-85	7.500	150.534	12.062	8.800	207.000	45.000	2.50%
1386-90	5.958	157.514	11.071	10.867	160.347	42.400	2.45%
1391-95	5.538	111.784	9.916	9.000	147.680	32.000	2.41%
1396-00		113.407		9.850		32.000	
1401-05	5.980	111.810	12.628	10.000	140.542	32.000	2.29%
1406-10	5.843	132.939	10.833	10.000	140.242	32.000	2.29%
1411-15	5.853	120.370	11.788	10.000	140.472	32.000	2.28%
1416-20	6.077	135.616	10.983	10.000	145.838	32.000	2.20%
1421-25	5.997	141.680	10.185	10.000	143.923	36.800	2.56%
1426-30	6.047	148.741	9.792	10.000	145.118	40.000	2.76%
1431-35	7.061	155.989	10.935	10.800	157.073	40.000	2.36%
1436-40	7.182	177.022	10.461	11.000	156.689	40.000	2.33%
1441-45	8.008	143.350	13.741	11.000	174.729	40.000	2.09%
1446-50	7.719	138.904	13.491	11.000	168.419	40.000	2.16%
1451-55	6.828	127.434	12.921	11.000	148.977	40.000	2.46%
1456-60	7.857	148.845	12.729	11.000	171.417	40.000	2.12%
1461-65	8.000	112.030	17.285	11.000	174.545	40.000	2.08%
1466-70	8.188	121.900	16.145	11.000	178.636	40.000	2.04%

Sources:
For Ghent cloth prices: Stadsarchief Gent, Stadsrekeningen, 400:5 – 22, Stadsrekeningen 1347/48 to 1470/71.
For prices and wages: see sources for Tables 3 and 4. For fuller's fees: see sources for Table 5.

Table 8
Prices of Kortrijk's First Quality Broadcloths, Their Values in Units of the Flemish Commodity Basket, the No. of Days' Wages of Bruges Master Mason to Buy One, and Fulling Costs as Percentage of the Wholesale Cloth Price in Quinquennial Means, 1391-95 to 1456-60

Years (5)	Kortrijk Woollens 27 ells* prices at Bruges	Kortrijk Woollens 30 ells* prices at Bruges	Value of Flemish Commodity Basket in d groot Flemish	Value of Kortrijk 30 ell woollen in Flemish Commodity Baskets	Wages of Master Building Craftsmen in Bruges in d groot Flemish	No. of Days Wages for Master to buy one Kortrijk Broadcloth (30 ells)	Fullers' Fee for One Broadcloth in Three Days in d groot	Fulling Costs as Per cent of Broadcloth Price (27 ells)
1391-95	3.250	3.611	111.784	8.251	9.000	96.296	36.00	4.62%
1396-00	2.900	3.222	113.407	7.434	9.850	77.333	36.00	5.17%
1401-05	2.914	3.238	111.810	6.897	10.000	77.707	36.00	5.18%
1406-10	3.116	3.462	132.939	6.331	10.000	83.093	36.00	4.84%
1411-15	3.035	3.373	120.370	7.171	10.000	80.942	36.00	4.95%
1416-20	3.183	3.537	135.616	6.179	10.000	84.880	36.00	4.73%
1421-25	3.122	3.469	141.680	5.975	10.000	83.247	36.00	4.85%
1426-30	3.544	3.938	148.741	6.228	10.000	94.507	39.20	4.70%
1431-35	3.769	4.188	155.989	6.686	10.800	93.682	40.80	4.64%
1436-40	3.150	3.500	177.022	3.481	11.000	76.364	40.00	5.29%
1441-45	3.827	4.253	143.350	7.284	11.000	92.784	40.00	4.37%
1446-50	3.500	3.889	138.904	5.825	11.000	84.848	40.00	4.76%
1451-55	3.600	4.000	127.434	7.901	11.000	87.273	40.00	4.63%
1456-60			148.845		11.000		40.00	

* Note: Kortrijk woollen broadcloths were normally sold in sizes 27 ells (18.90 metres) long, while those of Ghent and Bruges were sold in sizes 30 ells (21.00 metres) long. To make the values of the Kortrijk and Ghent broadcloths more comparable, I have converted the actual prices for the cloths 27 ells long into those for cloths 30 ells long (i.e., priced by the ell). The fulling costs, however, are reckoned in terms of the price for the actual cloths, 27 ells long.

Sources:
For cloth prices: Stadsarchief Brugge, Stadsrekeningen 1370-71 to 1469-70.
For prices and wages, see Tables 3 and 4
For fullers' fees, see Table 6